FOOD INDUSTRIES

HOMES OF FAMOUS FOODS . . . NATIONAL BISCUIT CO.'S SHREDDED WHEAT, NEW YORK

IN THIS ISSUE:

Meat Packer Puts Enzyme To Work

How Well Quick Frozen Milk Keeps

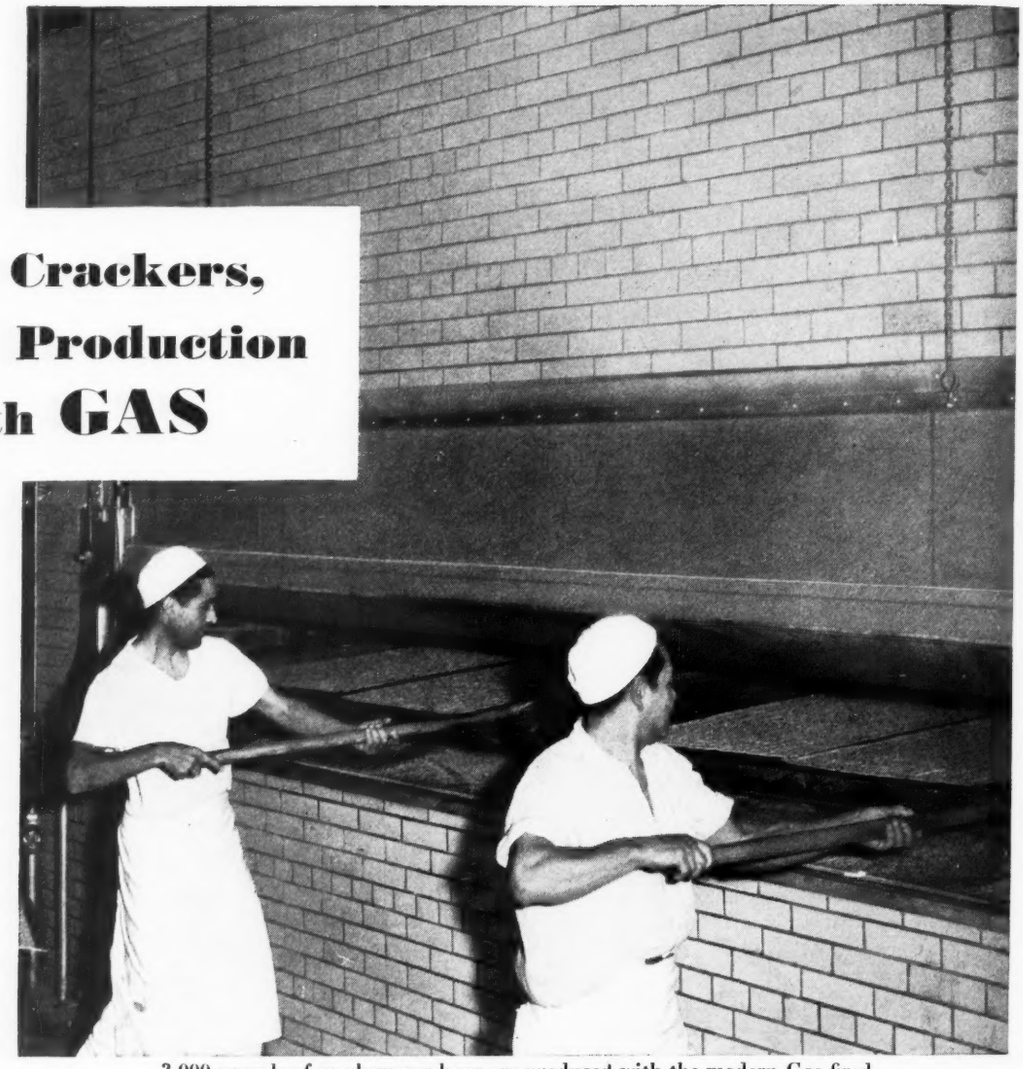
Effect of Drying Method on Composition

What Consumers Think of Food Manufacturers

Do's and Don'ts of Bargaining with a Union

McGRAW-HILL PUBLISHING COMPANY, INC.

Better Crackers, Speeded Production —with GAS



3,000 pounds of crackers per hour are produced with the modern Gas-fired oven equipment in the plant of the Sunland Biscuit Company, Los Angeles. The company says: "Only Gas would assure such efficiency."

When the Sunland Biscuit Company reconstructed its Los Angeles plant, it standardized on modern Gas-fired equipment.

The result will interest you.

"Only Gas fuel could provide the quick changes and accurate holding temperatures necessary for our varied cracker and cookie production—at such low fuel cost," says the company, which has installed the finest available Gas-fired reel oven equipment and whose double oven unit (capacity 3,000 pounds of crackers per hour) was especially designed to be fired from beneath with high pressure Gas burners.

In hundreds of similar food industries where heat processing is necessary as an important part of production, Gas and the latest type of modern Gas equipment are preferred—because of the greater speed, flexibility and economy of Gas. If you are seeking speeded production, plus an improved product and reduced losses from spoilage, why not call your Gas Company for full information.

AMERICAN GAS ASSOCIATION

INDUSTRIAL GAS SECTION

420 LEXINGTON AVENUE, NEW YORK CITY

FOOD INDUSTRIES

DISTRIBUTION
PROCESSING

PUBLISHED
MONTHLY

A McGRAW-HILL PUBLICATION

M. A. WILLIAMSON
Publisher

LAURENCE V. BURTON
Editor

E. S. STATELER
Associate Editor, Chicago

G. L. MONTGOMERY
Managing Editor

IVAN C. MILLER
Distribution Editor

F. K. LAWLER
Assistant Editor

R. S. McBRIDE, Washington, D. C.
PAUL WOOTON, Washington, D. C.
N. A. BOWERS, San Francisco, Cal.
S. T. HENRY, Spruce Pine, N. C.
EARLE MAULDIN, Atlanta, Ga.
ARTHUR S. ALLEN, Consulting Color Editor

Contents for JUNE 1940

VOLUME 12 • NUMBER 6

FOOD TECHNOLOGY

New Discoveries and Inventions

Food Technology
Viscosity and Heat Transfer 92
Improved Preservation in Cold Storage 92

Bakery Products
Adjusting Sponge Cake Formulas to Altitude .. 92

Beverages
Sherry-flavored Wine Made From "Foxy" Grapes 92

Dairy Products
"Ersatz" Culture Mediums for Milk Examination 94
A Little Tomato Juice for Better Butter Cultures 95

Canning and Preserving
Calcium Increases Firmness in Canned Tomatoes 95
How to Can Apple Juice 96

Fats and Oils
Oxidized Soybean Oil in Margarine 96

Meat Products
How to Tell Beef from Mutton in Sausage .. 96

Pickling
Lactic Acid for Pickles—III 97

Miscellaneous
Thiamin Content of Foods 97

★HOMES OF FAMOUS FOODS

Shredded wheat is one of the better known of nationally distributed foods. On the cover this month is pictured the large plant in New York, N. Y., where this product is manufactured by National Biscuit Co.

THIS MONTH

PROCESSING

The Do's and Don'ts of Bargaining with a Union 42
By Marshall A. Pipin
Short Time Pasteurization—A Correction 44
Meat Packer Puts Enzyme To Work 45
By J. M. Ramsbottom and C. A. Rinehart
The Way To Clean Stainless Steel 48
By G. C. Kiefer
How To Prevent the Browning of Peaches in the Freezing Industry—Part II 50
By J. G. Woodroof
Machine Grades Sizes by Weight 53
By Henry W. Young
How Quick Freezing Affects Keeping Quality of Milk and Cream 54
By C. L. Roadhouse and J. L. Henderson
What the User Wants in Edible Oils 56
By Gordon W. McBride
How Foods Are Frozen in the Northwest—Part III 59
By F. W. Knowles
Drying Method Changes Composition of Grapefruit Byproduct 62
By George N. Pulley and Harry W. von Loesecke
Proper Container Design Speeds Liquid Filling 64
By Frank B. Fairbanks
Program of Institute of Food Technologists Meeting 74

DISTRIBUTION

What the Public Thinks of Food Manufacturers 39
By Dickson Hartwell
Hints and Hurdles 67
New Packages and Products 68
Good on All Counts—These Food Delivery Trucks 70

EVERY MONTH

Talk of the Industry 35
Automotive 70
The Food Industry News .. 72
Business Trends 80
Men, Jobs and Companies 82
Food Equipment News ... 86
Food Technology — Abstracts 92
Books 98
Patents 99
Formulas for Foods 104
Catalogs 125

McGRAW-HILL PUBLISHING COMPANY, INC.

JAMES H. McGRAW, Founder and Honorary Chairman

Publication Offices: 99-129 North Broadway, Albany, N. Y. *Editorial and Executive Offices:* 330 West 42d Street, New York, N. Y.

Branch Offices, 520 North Michigan Ave., Chicago; 68 Post St., San Francisco; Aldwych House, Aldwych, London, W.C. 2; Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Atlanta, Ga.

JAMES H. McGRAW, JR., President
HOWARD EHRLICH, Executive Vice-President
MASON BRITTON, Vice-Chairman
B. R. PUTNAM, Treasurer
D. C. McGRAW, Secretary
J. E. BLACKBURN, JR., Director of Circulation

Published monthly; price 35c. a copy. Allow at least ten days for a change of address. All communications about subscriptions should be addressed to the Director of Circulation, 330 West 42d Street, New York, N. Y. Subscription rates: United States, Canada, Mexico and Central and South American countries, $3 for one year, $4 for two years, $5 for three years. Great Britain and British possessions, 30 shillings for one year, 60 shillings for three years. All other countries, $5 a year, $10 for three years. Entered as second-class matter Aug. 17, 1936, at the Post Office, Albany, N.Y., under the act of March 3, 1879. Cable address: "McGrawhill, N.Y." Member of A.B.P. Member of A.B.C. Contents indexed monthly in the Industrial Arts Index.

Copyright, 1940, by McGraw-Hill Publishing Company, Inc.

In THIS *Issue*

• YOUR EARS SHOULD BE RED

Because your customers are talking about you plenty in an article starting on page 39. They're saying things that show weaknesses in your business practices—that point to a job to be done in public relations. The public's opinion of food manufacturers and of the way they do things is summarized by Dickson Hartwell, who got his facts by personal-interview survey.

• LEST YOU LOSE YOUR SHIRT

More than one manufacturer—in the food industries, too—has lost his shirt in bargaining with shrewd labor union leaders. And others have lost it by refusing to bargain. The "Do's and Don'ts of Bargaining with a Union", page 42, tip you off as to what you should and should not do when the union in your plant makes embarrassing demands. The author, Marshall A. Pipin, is a lawyer with knowledge of the ways of labor leaders.

• PUTTING THE ENZYME IN HARNESS

Those biological catalysts, enzymes, are nothing new in food processing. They have been doing tricks vital to processing since the food industry was born. But they just happened to be in the food and did their work without the direction of, and often contrary to the wishes of, the food technologist. Now a meat packer has taken an enzyme from one food—the pineapple—and put it to work, under control, in improving the quality of another food, sausage. Maybe you too can do something with enzymes. Page 45.

• WHY FREEZE MILK?

There has been some question as to the purpose that would be served by quick freezing milk and cream. So tests were carried out by C. L. Roadhouse and J. L. Henderson of the University of California. The conclusions are that quick freezing has a place in the dairy industry for preparing fresh pasteurized milk and cream for use on shipboard and for emergency supplies. Page 54.

• METHOD AFFECTS PRODUCT

When there are two ways of doing something, the finished products of the two methods should be studied to determine which is best. A case in point is discussed on page 62. G. N. Pulley and H. W. von Loesecke give results of studies made on cattle feeds from citrus cannery wastes. These results show that the method of drying the waste affects its final composition and that one method produces feed with higher sugar content.

In FORTHCOMING *Issues*

• KEEPING IT CLEAN

This is a story about how to produce uncontaminated foods. Something every food manufacturer should do, not merely because of ethical considerations, but because it is the only way to attain and keep top quality in the product. Help on this important problem will be given in July by Paul S. Prickett and Nathan F. True, of Mead Johnson & Co.'s bacteriological and chemical laboratories.

• YOU MUST MAKE THEM BLUSH

Fresh fruits will attain the blush of ripeness if left long enough on the tree. But then they are too soft for shipment to distant markets. So they must be picked when "commercially ripe" and bought to full blush under artificial conditions. A review of artificial ripening, by Norwood C. Thornton of Boyce Thompson Institute for Plant Research, Inc., starts in July.

• MORE ON CONTINUOUS PROCESSING

In April, 1939, we printed the first article on the continuous process of jelly manufacture developed by Dr. G. T. Reich. Other food technologists have also worked on this problem, achieving the same result by somewhat different means. This development forms the subject of an article soon to be published.

• WHY COUNT BACTERIA?

When passing upon the suitability of foods for human consumption, public health authorities tend to place most reliance, in many cases, upon the numbers of bacteria present, without regard to what kind of bacteria they are. Some food technologists do not agree with this stand, maintaining, in fact, that certain bacteria are harmless, or even useful. This disagreement will be aired in a forthcoming issue by a food technologist well known in the dairy products field.

• ANOTHER ON PRODUCT PROTECTION

A number of methods have been developed in recent years for preventing the insect infestation of food products—some chemical, some electrical. In contrast, mechanical action is the basis of the most recent method investigated by FOOD INDUSTRIES. The story of how this works will be published soon.

FOOD INDUSTRIES
DISTRIBUTION • PROCESSING
Established 1928 — McGraw-Hill Publishing Company, Inc.
LAURENCE V. BURTON, Editor
Volume 12, Number 6 June 1940

The Talk of the Industry

» THE WAR is now on in earnest. When making your calculations on where you will or won't get your supplies, and what will be the effect of lost export markets, don't omit from your reckonings the matter of possible civilian relief in conquered countries.

» JUDGING by the events of mid-May, it would seem as if nutrition specialists should rapidly study the problem of feeding soldiers and sailors in the tropics.

» ACCORDING to E. G. Eppenbach, of colloid mill fame, a new food product is developing in California. Ten percent of pitted ripe olives are homogenized with a bland vegetable oil like corn, cottonseed or tea seed oil to produce an "olive oil" that is said to be better flavored than the finest virgin olive oil produced anywhere in

the world. And the cost is considerably less than for the real thing.

How to label such a superior product will be a serious problem. Certainly it would be unwise to call it "Imitation Olive Oil" if it is actually superior to the best quality of genuine olive oil.

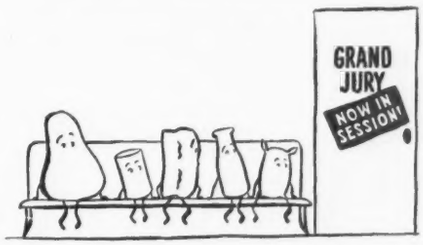
Gratuitous suggestions: "Corlive," "Cotlive" or "Tealive" oil.

» INDUSTRIAL EARNINGS continue to be unexpectedly good. First-quarter 1940 figures for that group of aristocrats known as the "30 Industrials" in the Dow-Jones Average compare splendidly with the first-quarter figures of a year ago.

Food industry earnings, never as handsome as the earnings of non-food manufacturing, have likewise shown gratifying increases over 1939. Only a very few concerns have shown less satisfactory figures.

» PROFESSOR LEWIS B. ALLYN is dead, apparently murdered in gangster fashion. Old timers will remember his picture in pure food ads featuring the "Westfield Movement" some 20 or 30 years ago. His picturesque shock of white hair and intent gaze into a test tube or microscope symbolized the food scientist to the layman of that day. Who killed him, and why, are mysteries, though rumor has it that he had refused to disclose a vitamin secret. Food is an exciting business, but never before quite so tragic.

» THE PROPOSED grand jury investigation of the food manufacturing industries instigated by the Department of Justice, to find out if there are any violations of the antitrust laws, will be followed with much interest throughout the industry. The investigations —if they really come off—will be a stupendous task, and a very costly one, not only for the government, but the manufacturers and distributors. That Assistant Attorney-general Thurman W. Arnold partially realized the size of the undertaking is shown by his announcement that it will require a year and the examination of more than a thousand witnesses. He further says that grand juries will be at work both in Chicago and New York. Assuming that a single jury will be at work in each city, there will be about 500 witnesses per jury.



How rapidly the juries will be able to hear the witnesses is anybody's guess. If they proceed at the rate of two per day, the two simultaneous investigations will occupy an entire year.

After that there will either be indictments or else no indictments. If the former, then the trials will come after a lapse of time. There will be still more expense for all concerned and the trials will be exceptionally consuming of time.

To predict the outcome would be unwise. Yet one cannot avoid believing that the investigations will be a good thing if they are thorough and impartial.

Unfortunately, grand jury proceed-

ings are secret. If they were public hearings, like Congressional investigations, it is believed that the testimony would show there is no possibility of a monopoly in the business of manufacturing foods. That evils exist, or that there is a considerable amount of union racketeering in the field of food distribution, no one will deny, but there is little likelihood of indictments because of collusive arrangements between manufacturers and unions.

As usual, those concerns that understand and have practiced the sound principles of good public relations for a long time will receive a clean bill of health and a minimum of annoyance from the grand jury study of their affairs.

Time To Arm Ourselves

SOME idealistic, though misguided souls, believe that if you mind your own business, behave yourself and pay your bills, you will keep out of trouble.

Just like Denmark, Norway, Finland, Czechosovakia, Austria, Albania, Poland, Ethiopia, Netherlands, Belgium and Luxemburg.

The basic error of such idealistic thinking apparently stems from generalizing on one's personal experiences in a country that is fairly well policed. In international affairs there is no police power to protect the rights of a peaceful state. When another nation, with a low state of civilization, covets the possessions and fruits of peaceable efforts, there is no protection but armed might, skillfull defense and fierce determination to resist.

For the United States it is high time to begin an enlarged defense program. American defense strategy is based on the now obsolete idea that an enemy could not possibly land on our shores in less than six months after the outbreak of hostilities. Before 1939 our Washington experts believed that European nations had only two weeks in which to mobilize. The events of April, 1940, prove that the available time is actually less than two hours! A corresponding reduction in mobilization time from six months would permit the U. S. only 24 hours.

Think it over.

Prospects in Latin America For Machinery, Not Food, Sales

INTERRUPTION of trade between South and Central American countries and many European belligerents and neutrals has raised hopes in some American food manufacturing quarters of increased food sales to Latin America. Though this seemed a doubtful proposition from the start, FOOD INDUSTRIES decided to run the matter down and see what the prospects really are.

Contact was made with men who know the facts, in the United States government departments, in Latin American embassies and among food companies that do business in Latin America. The first thing established was the general trend of American exports of food to Latin America. This trade has been steadily decreasing for two decades. At the beginning of that period, foods constituted almost two-thirds of all American sales to Latin America. Now these products account for only about one-third of sales. The next question was whether the war was likely to reverse this trend. Unanimously, all who were interviewed said, "No." In fact, most thought that the existing trend would continue, as Latin American countries are producing more surplus food and are endeavoring to enlarge their production and export of processed food products.

It seems likely, therefore, that while the war will not increase the opportunities of food manufacturers to sell to Latin America, it will increase the sales of food processing equipment to our neighbors on the south. In fact, news has just come in of the sale of considerable food packaging machinery, mostly for candy and baked goods, to South American manufacturers who would formerly have purchased this equipment in Germany. Business is business, even when it results in increased competition for American foods in the world market.

Government Cooperates In Standard Change

CURIOSITY was aroused throughout the food industries by the hearing held in Washington, on May 2, on amending the definition and standard of identity for canned tomatoes so that calcium chloride might be added in small amounts to improve firmness. This was the first hearing to amend a standard ever held. Naturally, everyone wanted to know whether the

Hors d'Oeuvres

• Bread is not the chief food of the human race. Rice is the staple diet of more than half the world's population. And unless the Allies take the "Blitz" out of "Blitzkrieg," the people may even be eating a substitute for rice—granulated knotholes, or something.

• *More people eat more ice cream every year. Last year they ate nine quarts each, a new record. So civilization progresses, Blitzkriegs notwithstanding.*

• Some five million bushels of soybeans was produced in 1934. In 1939, 87 million bushels was harvested. This bean is even more prolific than the Chinese who gave it to the world.

• *More than half a billion dollars is spent a year in the United States for carbonated beverages. Which makes Americans the hardest soft drinkers on earth. What is this new generation coming to?*

• It is estimated that the nation's yearly production of milk would make a river 750 miles long, 80 ft. wide and 5 ft. deep. But the Nazis could cross it on a pontoon bridge.

• *You can't tell the quality of spaghetti by the length of the pieces, says the FTC. But you can tell the nationality of the man who eats it without putting more stripes on his necktie.*

• Belle Center Creamery Co. will build a $100,000 plant to produce lactose "for use in baby foods and as a basic material for smoke screens and munitions." Isn't technology wonderful?

• *News headline: Beer Famine in Berlin. Maybe that's why Hitler tried to blow the foam off the Kattegat.*

• "The Physics of the Divining Rod" has been published in England. We always thought the technic of locating hidden things with a forked stick a bit unscientific, but maybe not. Perhaps you could find worms in apples, sand in spinach and bacteria in butter with the thing.

• *Mayor Fiorello (Little Flower) La Guardia's favorite seafood is finnan haddie. The way he goes after his adversaries you'd think he lived on shark meat. Or maybe the Little Flower just has a Ferdinand complex.*

• The largest single item in the cost of producing beer is taxes. In some states this item amounts to 50 per cent of the total cost. Which puts beer on a par with gasoline, though it doesn't have half the octane rating.

• *They're now labeling frankfurters with a paper band a la cigars. El Ropo dogs! What, no muzzle.*

• Pepsi-Cola has appointed a Negro promotion man to concentrate on the Negro market. A case where coming sales cast their shadows before.

F.K.L.

government would be cooperative or obstructive—in fact, whether these standards of identity would prove to be flexible instruments under which the food industries can grow and make progress, or effective barriers to all future development.

If this first hearing is a fair sample of what is to come, the food industries can face their future under the regulation of these definitions and standards without fear. The hearing was conducted ably, sympathetically and with expedition. One day sufficed to hear and examine all witnesses. And arrangements were made at the hearing for findings of fact based on the evidence, conclusions and argument to be filed on May 13. This date subsequently was officially confirmed.

In hastening the proceedings along in this highly satisfactory manner, the government recognized the importance to the industry of an early decision, which would be very helpful to the canners, permitting them to order new labels well ahead of the canning season and making possible the addition of calcium chloride to canned tomatoes during the current year, provided the proposed amendment was acted upon favorably. Final decision on the amendment should be forthcoming from the Secretary about the time these words reach our readers.

Surely, the proceedings as here outlined leave little to be desired in their consideration for the needs of the industry. Both the administration and the industry are to be congratulated on a job well done. If the new definitions and standards are to be administered in this fashion, the best interests of all parties—the Food and Drug Administration, the manufacturers and the consumers—will be served.

Transfer of Food & Drug Administration

MANY are wondering what will be the net result on enforcing the Food, Drug and Cosmetic Act when and if the Food & Drug Administration is transferred to the Federal Security Agency under Paul V. McNutt.

Up to now, everybody in Washington is keeping heads down, saying very little. But this much is known: McNutt is a lawyer, former Dean of Law, University of Indiana; also, he is an able executive, experienced as dean of a law school, president of the American Legion, governor of Indiana, governor general of the Philippine Islands.

On the other hand, he is also a politician, able to handle himself in rough-and-tumble battles. And though he has known political ambitions, he is not yet beholden to any particular political bloc, unless perchance it be the American Legion. Mr. McNutt ought to be regarded as one who will encourage fair and just policies.

First Annual Meeting
Of Institute of Food Technologists

Every production man, every quality control chemist, every research worker in the food industry who can possibly attend the meeting of the Institute of Food Technologists this month will find it decidedly worth while to go to Chicago.

This is the one society that brings into focus all the technological knowledge of the food industry.

Management is also urged to attend in person and to send as many technical men as possible.

PLACE: Hotel Morrison, Chicago TIME: June 17 to 19

(Program on page 74)

Again, We Remind You!

THIS is the time of year when food manufacturers should renew their interest in technically trained young men. Such youngsters with fresh sheepskins from the colleges will be looking for jobs. And some of them are the future leaders of the food industries.

The busy executive who wants "practical man" results will wonder what to do with such applicants when they come to him looking for employment. Some will claim to be chemists, others chemical engineers. Some will state that they are graduate "food technologists." All of them deserve a hearing and some of them employment.

The answer to the question "What shall I do with them?" is easy. Put them in overalls. Give them a job where they can do useful work and get acquainted with the real problems of the industry. But that is only the start. Ask them to come into the office to talk things over after a few days and again at intervals of a week or a month. They will bristle with ideas. They should be encouraged to do so. You may be surprised that occasionally the ideas will be good. Of course, many will be poor suggestions. But they will give you, the boss, a chance to teach the youngster why the economics and works conditions that prevail in your particular industry make necessary some schemes that look strange to the college lad.

But be sure before you criticize that you can defend the present practice. Don't forget that you and the lifetime habits of your plant may be wrong. That will not be embarrassing unless you have been too emphatic in defending the wrongness.

Why Honor Brand Headquarters Is in California

MUCH speculation and conjecture has gone around the trade as to why Honor Brand Frosted Foods, owned by Stokely Brothers & Co. of Indianapolis, has moved its headquarters from Indiana to Oakland, Calif. The answer is that at least 80 per cent of Honor Brand's production is to come from California, Oregon and Washington. This, in turn, is based on the necessity of consolidating different items into carload lots in order to obtain the lowest possible freight rates.

In freezing preservation of fruits and vegetables, the major problems are still the production of a balanced line, rigid quality control and the broader aspects of distribution.

Repealing the "Rule of Reason"

MANY food executives will be rather startled by a Supreme Court decision of May 6 which had nothing to do with foods. It was the confirmation by the country's highest tribunal of the conviction of petroleum marketing companies and some of their executives for violation of the Sherman law. That decision may importantly affect food company planning.

The court said that any combination between companies formed for the purpose or with the effect of raising, depressing, fixing, pegging, or stabilizing the price of a commodity in

interstate commerce is *illegal of itself.* Even such combinations as might have an important public service value are thus doomed. Cooperation in price matters becomes under these circumstances highly dangerous—no matter how good the motive or how open the proceedings.

Many years ago in another famous antitrust case the Supreme Court laid down the "rule of reason." That earlier decision seemed to imply that monopolistic tendencies had a right of existence within certain limits. But the present decision certainly seems to repeal that earlier permissive idea. Food executives are forewarned.

Clouded Outlook for Paper

IN another few weeks or months the full import of the war in Scandanavia will be felt by users of paper. Swedish wood pulp, superior in quality to much of our own domestic stuff, is no longer available unless by rare chance it can come to us via the Finnish port of Petsamo. Prices of paper products may possibly go up, but changed quality appears to be a certainty.

Those whose packaging problems have appeared to be completely solved may suddenly discover that plenty of new problems will arise from the 100 percent substitution of domestic raw materials in paper making.

The times will call for close and frank cooperation between all concerned with packaging supplies.

No Transparent Plastic Milk Bottles—Yet

REPORTS in the daily press in the recent past have hinted that National Dairy Products Corp. is testing out a new transparent plastic milk bottle—a development that is denied by officials of that company. Every manufacturer of plastics and every maker of milk bottles has been besieged with inquiries to the point of exasperation and no one will admit or confirm the story.

After summing up all the available information, we believe that the following gives the present status of the slightly distorted tale: (1) Experiments actually have been carried out to determine if plastics can be blown into bottle shapes. (2) Plastic bottles having the shape of milk bottles have been blown. (3) Available transparent plastics are unsuited for containing milk. (4) There will be no transparent plastic milk bottle until a new and suitable plastic has been developed. (5) The concern which has done the development work up to this point is not in the plastics business and is merely in the position of being ready when some chemist comes through with a suitable plastic. (6) Present plastics (*a*) are too costly, (*b*) are impossible to sterilize adequately by currently used methods and (*c*) impart a flavor to the milk.

The identity of the experimenters is not to be divulged—Save your postage.

Flavors in Dry-powder Form

MOST of the common flavors for use in food manufacture will soon be available in the form of a dry powder instead of the customary liquid extract and concentrates as has been the case heretofore, according to information that has been received by FOOD INDUSTRIES. Though the new products are still in the development department stage, the commercial possibilities are rather interesting.

Relative costs are not yet available, but it would appear that a flavoring material made without the added expense of tax-paid ethyl alcohol should be cheaper to produce than the customary alcoholic extract.

As it appears to us, the more interesting aspects of powdered flavors lie, not in the fact that they are powders, but that they are free from water or any other solvent. For example, moisture is ever a problem for the manufacturer of chocolate coatings, and likewise the user. Hence, a dry powdered flavoring material may find use here.

Powdered gelatin desserts and pudding or ice cream mix powders also come to mind as places where dry flavors may be useful. For certainly there is no material gain if the flavor is added as an extract and then the solvent is subsequently evaporated off, together with a part of the original flavor.

Whether the dry flavors will have any real interest for the manufacturers of wet food products will be determined, we believe, by the relative cost of obtaining the desired flavor by the use of the new powders.

It Was NOT Molasses

THE APPROACH of fly time reminds us of an experience embarrassing to one of our hosts on the occasion of a plant visit during one summer. Here is what happened:

We were going from one department to another through a ground-level section near the shipping platforms of the company. As we came along through the corridor, our guide, the plant superintendent, began to exclaim about what he thought was a pool of molasses that someone had spilled on the floor. As we approached this pool, it suddenly took wings and flew away. It had been nothing but a tremendous mass of flies accumulated on some spilled dried milk powder.

It takes but little imagination to guess the embarrassment of our host, and our surprise at this episode in what is nationally thought of as one of the model industries of the food business. You can prevent a similar occurrence in your own plant if you do what we suspect this superintendent did shortly after our departure.

The cause of the entry of all this mass of flies was a screen door propped open nearby. The boys in the shipping department did not want to bother to stop and unlatch and hold open this door each time their loaded trucks were ready for wheeling onto the adjoining loading platform for truck or freight car dispatch. The root of the trouble was, of course, the wrong kind of screen door. What they needed was a rugged reinforced door which could be opened by pushing against it with the trucks. The old style door with a latch that had to be opened by hand was altogether out of place.

How about your doors? And have you screens on all the doors and windows? This is the right time of year to ask yourself such questions and then to make a thorough plant inspection to be sure that a negative answer is really justified.

Rearmament's Effect on Food Manufacturers

FARSIGHTED food manufacturers, must give immediate heed to the effect of the rearmament program on the future of their factory operations.

It is inevitable that journeyman machinists will soon be drawn into arms manufacture to the extent that non-military operations may be seriously affected.

It would, therefore, be prudent to purchase immediately any replacements of machinery that are planned during the next three years. Shops will be swamped with war orders as soon as the armament program gets under way.

Machinists in the employ of food manufacturers may also be lured or drafted into armament plants. Which will necessitate a study of plans for repair crews during the intensive days ahead.

Let us utilize even greater foresight in our industrial planning than is characteristic of the nation that has set the world in flames.

What The PUBLIC THINKS Of Food Manufacturers

Survey of consumer opinion reveals where public relations are weak

By DICKSON HARTWELL
Hartwell, Jobson & Kibbee, New York, N. Y.

ACCORDING to a poll recently made for FOOD INDUSTRIES by the research division of Hartwell, Jobson & Kibbee, New York, the public holds the food business in almost as high esteem as any other business and in higher esteem than most. Even so, the poll reveals that much is yet to be accomplished before food manufacturers erase the adverse opinions of too great a portion of food buyers.

The purpose of this study, which was conducted through personal interviews, was to measure public attitude toward the food industries, toward products and retail prices, toward some economic aspects of food distribution, food advertising and trade practices. This poll does not necessarily reflect the opinion of the whole country. It was confined geographically to the area east of the Mississippi It was further confined to urban customers. Some of the questions asked requested the opinions on the labor-farmer-industry problem. Therefore rural areas were not polled.

This study is also to a large extent the reflection of the opinion of women, who represent 80 percent of the poll. However, through cross checking, the fact has been brought out that there is little difference of opinion between men and women on most of the questions asked in this study. The one exception is the difference of opinion of men and women on the question of government ownership of industry.

This is a study of
PUBLIC RELATIONS

It concerns
All Food Manufacturers

Because it is a poll of the public's opinion of the industry and its business methods. It reveals the weaknesses of food manufacturers' public relations and indicates where emphasis should be placed in improving them.—The Editors.

Personal-interview survey of public opinion brings out some surprising facts.

Though rural areas were not included in this poll, the persons interviewed are an accurate economic cross section of the cities in which they live. The economic groups covered fall in the following classifications according to the percentages given: (*a*) The upper, 10 percent; (*b*) the upper middle, 30 percent; (*c*) lower middle, 40 percent; (*d*) the lower, 20 percent.

The first question asked was: "As far as the industries themselves are concerned and the way they are run, do you think well or otherwise of the following?" The tabulated results of the replies to this question bring out several important facts. (Table I).

Almost as large a portion of those interviewed thought as favorably of the food industries as of any other business or industry. Only the insurance business was better thought of than the industry producing the country's food. This fact might be gratifying to food manufacturers were it not for the remaining data in Table I. Only the drug and cosmetic industry drew more unfavorable comment from those interviewed than did the food industries. Those interviewed were more definite in their favorable and unfavorable opinion of the food industry than in the case of the other businesses. Only 11.2 percent of those interviewed were undecided.

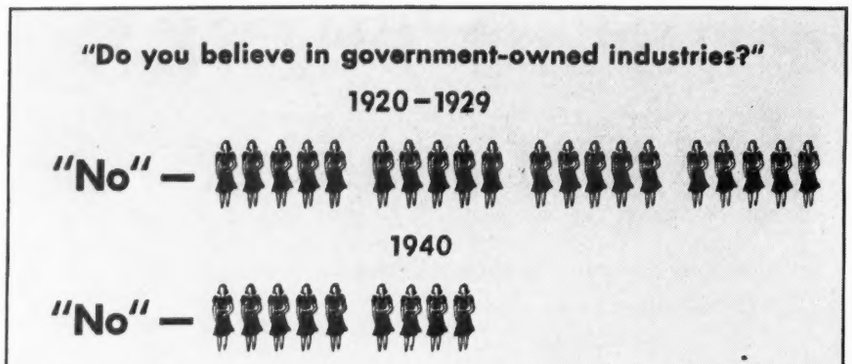
Less than half of those interviewed were favorably impressed with the steel industry. On the other hand only 10 percent held the industry in disfavor. In the case of the remaining 40 percent the steel industry was too foreign to their experience for them to form any opinion. The fact that only about one-tenth of those whose opinions were polled had no definite ideas regarding the food industries is not surprising, since 80 percent of those interviewed were women whose lives are daily associated with food and food buying.

The next question was designed to reveal the reason why those interviewed held the opinions they did about the food industry. Answers to the question "For what reason do you like or dislike the food industry?" are tabulated in Tables II and III.

Those who expressed an opinion favorable to the food industry were most influenced by the products themselves. Almost two-thirds who gave a reason for liking the food industry were influenced by the industry's products. The things people liked about the food manufacturers' products in order of their importance are: "The products are pure," "the products are of high quality," "wide variety of products," "they have attractive packages."

The public has high regard for the canning industry—not so high for the dairy, meat, baking and breakfast food industries.

The next important influencing



Comparison between the attitude of the public toward government-owned industries in the period 1920–29 and in 1940. There is a significant change.

factor was the industry's practices. Practices given favorable mention, in the order of their importance were: "Prices are low," "industry well regulated," "good service," "there is free competition." Although these answers represent the opinions of only a fifth of those interviewed, they nevertheless indicate that a few food manufacturers have sowed good public relations seeds on fertile soil.

An analysis of Table III would indicate that much is yet to be done by the food manufacturer in improving relations with the public. Those who viewed the food industries unfavorably objected largely to industry practices. The reasons, in order of their importance, were: "Food prices are high," "too much profit," "poor distribution," "poorly regulated," "they are monopolistic," "they fix prices," "poor service." A relatively small portion objected to the products themselves.

The reasons assigned for disliking the food industries and food products should aid food manufacturers in planning their public relations programs. In order of their importance, they are: "Impure products, unsanitary conditions, etc.;" "poor quality of products;" "misleading labeling."

The next questions was designed to determine to what extent specific food industries brought out favorable or unfavorable responses. Table IV gives the responses to the question: "As far as the industries themselves are concerned and the way they are run, do you think favorably or unfavorably of the following?"

The fact that 45 per cent of those interviewed could not express an opinion regarding either the fishing industry or the frozen food industry would indicate that these industries have an opportunity of expanding sales by educational promotion.

With the exception of the fresh fruit and vegetable industry, canning drew the most favorable comment and the least unfavorable comment. This should be gratifying to those who are conducting public relations for the canning industry. However, the fact that almost 20 percent of those interviewed expressed no opinion would indicate that the job is not complete.

A fourth of those interviewed were dissatisfied with the milk and dairy industry. Less than 10 percent were without opinions; in light of this fact the favorable response is discounted below that of all the rest of the industries. The meat industry polled the next largest percent of unfavorable opinions, followed by the baking and the breakfast food industries.

By cross checking the answers to several questions, it was shown that the people who were unfavorable toward the food industry in general tended to be unfavorable toward the milk and dairy industry (40 percent were in this category), the meat industry (39 percent) and the breakfast food industry (23 percent). Those who were favorable toward the food industry in general favored fresh fruits and vegetables (88 percent) and the canning industry (86 percent).

The size of the samples taken for this study made it possible to break down the last question by asking those who were unfavorable to the food industries for their reasons (Table V).

The small percentage of "don't knows" in this table indicates that those who dislike the food industries have definite reasons for their attitude. This table also brings out the fact that different industries are objected to for different reasons. There is an interesting comparison between the milk and dairy industry and the breakfast food industry. Eighty-five percent of the objectors disapproved of practices of the dairy industry, while only 13 per cent objected to the practices of the breakfast food industry. In the case of both industries approximately 10 per cent objected to the product. The particular practice objected to by those who held the dairy industry in disfavor was "low pay to farmers and high retail prices." This one statement covers the major and almost the only objection to the milk and dairy industry. It narrows the public relations task of this industry to convincing two groups of one fact.

Analysis of the high percentage of objections to industry practices in the meat industry indicates that this industry has a less cut-and-dried pro-

Breakfast food advertising rates low in public esteem.

gram than the dairy industry in bettering the industry's relations with the public. The practices objected to in the meat industry are typified by the following answers: "Prices too high," "too much profit," "inefficient distribution," "they are run poorly."

The baking industry faces entirely different problems from the other three. Apparently it will take more than public relations to improve the consumer relationship in the baking industry. Most of the answers indicate that objectors consider baked products of "inferior quality" or "impure." They believe "conditions within the industry are unsanitary."

The meat, dairy and baking industries may take consolation in the fact that there was no disapproval of the type, quality or volume of advertising. In view of this apparent approval, the

breakfast food industry may have reason for careful scrutiny of advertising programs.

The outstanding objection to the breakfast food industry was the industry's advertising. Seventy-five percent of those who voiced a complaint declared they did not like breakfast food advertising or that there was too much of it. Twenty-five percent believed that the advertising was misleading and untruthful.

Government Ownership

If, during the 10 year period from 1920 to 1929, any average group of citizens had been asked the question "Should the government take over any of the food industries?" the answer would have been almost unanimous: "No, keep the government out of business." This attitude is not so prevalent today. One of the questions in this survey was: "Do you believe in government-owned industries?" The answers are tabulated in Table VI.

The significant figure in this table is the 44.6 percent which represents the portion remaining who still believe that the government should not enter into business. The other 55.4 percent are either for government ownership or on the fence. This presents a ponderable situation for those who believe in private enterprise.

The results from each question in this study were cross checked to determine if there were any variations in different localities, any between men and women or by income groups. The answers to many questions varied so slightly geographically, by sex or by income groups as to be statistically unimportant. No geographic differences came to light in the question, "Do you believe in government-owned industries?" However, a much higher proportion of men were opposed to such ownership than was the case with women. This would indicate a real need for a public relations program directed at women individually and as members of organized groups to point out evidence of the value *to them* of private enterprise as compared to government ownership.

> The results of the questions in this poll which reflect opinions on food advertising and "loss leaders" will be discussed in a future issue of FOOD INDUSTRIES.—The Editors.

To those who stated they believed in government ownership of industry, the question was then asked: "Which food industries should be government owned?" On the average, each respondent named 2.3 industries, with the distribution of replies shown in Table VII. This table speaks for itself. Meat packers and dairymen have the greatest cause for concern, greatest need for better public relations.

Regardless of attitude toward government ownership of industry, each person interviewed was asked: "Would a government-owned food industry in this country result in higher or lower prices?" The results are shown in Table VIII.

Apparently there was no widespread feeling that government ownership was desirable because it would reduce food prices. Of those who believe lower prices would result, 32 percent favored government ownership in general while 32 percent were opposed to it. Of those who believed that higher food prices would result from government ownership, 64 percent disapproved of government ownership of industry and only 15 percent approved. As might be expected, the lower income groups were more in favor of government ownership than the upper groups.

It has already been pointed out that a large portion of those interviewed disliked particular food industries (especially the milk and dairy industry) because of presumed low prices paid to farmers for their products. In order to obtain further light on the urban dweller's attitude on this farmer-labor-industry problem, this question was asked: "Should either

(*Turn to page 101*)

Table I—"As far as the *industries themselves* are concerned, and the way they are run, do you think *well* or *not so well* of the following?"

Industries	Favorable (percent)	Unfavorable (percent)	Don't know (percent)
Electrical	64.4	16.0	19.6
Automobile	71.2	10.4	18.4
Drugs & cosmetics	51.8	22.8	25.4
Steel	49.0	10.2	40.8
Food	72.0	16.8	11.2
Insurance	74.2	11.2	14.6

Table II—"For what reason do you like (dislike) the food industry?"

	Favorable (percent)
Answers referring to industrial practices	21.1
Answers referring to product	45.5
Answers referring to advertising	.5
General reasons	3.7
Miscellaneous	1.3
Don't know	27.9

Table III—"For what reason do you like (dislike) the food industry?"

	Unfavorable (percent)
Answers referring to industrial practices	67.7
Answers referring to product	15.6
Answers referring to advertising	8.3
General reasons	....
Miscellaneous	4.2
Don't know	4.2

Table IV—"As far as the *industries themselves* are concerned, and the way they are run, do you think *well* or *not* of the following?"

Industries	Favorable (percent)	Unfavorable (percent)	Don't know (percent)
Milk and dairy	64.8	26.4	8.8
Baking	70.8	10.8	18.4
Fish	47.2	7.6	45.2
Meat	68.6	16.2	15.2
Canning	77.4	3.2	19.4
Frozen food	48.6	6.2	45.2
Fresh fruits and vegetables	81.0	7.6	11.4
Breakfast food	67.4	10.8	21.8

Table V—"For what reason do you dislike certain food industries?"

	Milk and dairy (percent)	Baking (percent)	Meat (percent)	Breakfast food (percent)
Object to a particular practice of the industry	85	31	67	13
Dislike products	12	54	27	11
Dislike their advertising	..	..	..	40
Miscellaneous	2	..	1	24
Don't know	1	15	5	11

Table VI—"Do you believe in government-owned industries?"

	Percent
Yes	22.8
No	44.6
Depends	14.6
Don't know	18.0

Table VII—"Which food industries ought to be government owned?"

	Percent
Milk and dairy	38.2
Baking	16.4
Fish	19.1
Meat	58.1
Canning	25.4
Frozen food	13.6
Fresh fruits and vegetables	23.6
Breakfast food	15.5
Other food industries	22.7

Table VIII—"Would a government-owned food industry in this country result in higher or lower prices?"

	Percent
Higher	28.6
Lower	29.8
Neither	5.8
Don't know	35.8

Table IX—"Where would or should the increase for labor and the farmer come from?"

	Percent
Would be willing to pay higher retail prices	52.0
Lower profits to manufacturers, executives, middlemen, retailers	28.2
Fewer food handlers	4.1
Less pay to farmers or labor to enable other group to get more	1.2
Miscellaneous	2.4
Don't know	12.1

DO'S and DON'TS Of Bargaining with a Union

By
MARSHALL A. PIPIN
Member of Law Firm of Deneen and Massena, Chicago, Ill.

A STRIKE during the rush season is expensive to any company. In this regard the food industry is particularly vulnerable; and of the industry, those who handle perishable and seasonal commodities are at the greatest disadvantage. Threatened loss of an entire season or of the heart of a season has often forced capitulation to unwarranted union demands, to the detriment of the profit and loss statement.

No one can guarantee against strikes, but certain safeguards may be observed. This is particularly true of the new strike tactics in use since the National Labor Relations Act was passed. These tactics and the first principle of bargaining with the union are emphasized by my recent conversation with two business agents of a national union. We had met to dispose of Labor Board charges filed against my client by the union following an unsuccessful strike. The union agreed to dismiss the charges in such a manner that they cannot be made again, although nothing was conceded by the company that had not been offered to the union before the strike. Conceding defeat, one of the business agents said to me, "If you hadn't been in this matter we would have won." I asked, "I have not opposed the union as such or opposed the idea of collective bargaining, have I?" His answer was: "No, and that is the very reason you defeated us. Most representatives of management try to fight the union as such, and as a result violate the Labor Act in so many respects that they have to grant our requests in order to escape a Labor Board order against them."

Even if a violation of the Labor Act does not involve the employer in a strike, it likely will involve him in a Labor Board charge. Many companies in the food industry have learned this too late for their own comfort—and for the good of their pocketbooks in the case of Board orders for back pay.

How can one deal with a union without violating the Labor Act and at the same time protect one's own interests? The rules in this regard are general in their application to all industries but none the less directly applicable to each individual company.

The person who refuses to accept the fundamental precepts of the National Labor Relations Act—the employees' right to organize, free of employer interference, and the obligation of the employer to bargain with the union selected by a majority of his employees—can hardly be expected to avoid fouling the Act. Yet, many other employers, though willing to recognize the union, encounter trouble with the Labor Board.

Of course, it is to be understood that there is no obligation upon the employer to bargain with the union until the latter represents a majority of the employees of an appropriate unit. Proof of majority representation may be required by the employer before recognition, even to the extent of a Labor Board election. This right to challenge, however, must be expressly asserted at the outset if it is to be relied upon to excuse failure to bargain.

Once a union's representation is established or conceded, there are two methods of bargaining—the "don't" method and the "do" method. The former, based on Labor Board decisions, falls into general classifications which follow the various steps in negotiations.

Obviously, if there is to be any bargaining, the first step is for the parties to meet together. One's actions in relation to this preliminary stage will subsequently have a great evidentiary bearing on one's good faith in the matter. So:

Don't refuse or delay unnecessarily meetings with the union officials or intentionally fail to keep appointments with them.

Don't refuse to receive union proposals.

Don't refuse to negotiate with the

Acme

This scene represents one of the "do's" in dealing with organized labor. Here workers are voting on whether they want organized labor representation or their present nonunion status.

Acme

This is the type of trouble food companies can sometimes avoid by knowing the "do's" and "don'ts" of bargaining with a union. Union milk wagon drivers, striking for union recognition and higher wages, overturned dairy trucks and poured milk into the streets of Toledo, Ohio, in 1935.

union because a strike is in process or a plant has been shut down.

Don't reopen a plant during a strike without first negotiating with the striking union.

Don't offer the union recognition as representative of only its own members. Representing a majority, it is entitled to bargain for all employees in the bargaining unit.

Don't set as a condition precedent to bargaining the withdrawal of Labor Board charges or the signing up by the union of your competitors.

If the parties are really desirous of reaching an understanding on any matter there must be proposals—and counter proposals if the original ones are not satisfactory. The absence of such an attempt to find a basis for agreement may indicate a lack of a desire to bargain in good faith. This does not necessarily mean that you must always compromise, but:

Don't evade discussion of union's demands with the attitude that there is nothing to discuss.

Don't merely refuse demands of the union for contract terms without counter suggestions as to a basis upon which to reach an agreement.

Don't make counter proposals so illusory as not to form a basis for negotiation or ones containing only terms changeable at your own option.

Don't shift reasons for refusing union demands from one ground to another.

There is nothing so bad as to be ignored or to have some one try to go over your head. Such tactics with the union may be evidence of a desire to undermine or to void dealing with the union. So:

Don't try to make an agreement with individual employees in place of a collective contract after bargaining has been initiated by the union.

Don't during negotiations post notices to employees discussing union's demands nor seek to induce your employees to discuss with you by themselves their grievances when they assert that they are not authorized to do so in the absence of the union representatives.

Don't impose a wage cut during negotiations in which wage rates are one of the matters proposed for discussion.

Certain terms, such as the closed shop, the check-off or perhaps a wage increase, may be highly objectionable to an employer or even impossible to meet. Although you may refuse such demands, yet:

Don't refuse to bargain on other terms when certain ones are objectionable until it becomes clear that the union will not make a contract without the objectionable demands.

Don't refuse to make a contract because you fear that eventually, although not now, this will lead to the closed shop, the check-off or some other objectionable feature.

The question of whether collective bargaining under the Labor Act requires a written agreement has been answered in the affirmative by four Circuit Courts of Appeal and in the negative by one. The final word on this remains to be, and soon should be, given by the Supreme Court of the United States.

A question precedent to that of a written contract is whether there is any obligation to make a collective agreement at all, either oral or written. The dictum of the Supreme Court in the Jones-Laughlin case was that the Act only requires the employer to deal with the representative of his employees and does not require a collective agreement. Subsequently, doubt was cast upon this by the Court's statement in the Consolidated Edison Co. of New York case that: "The Act contemplates the making of contracts with labor organizations" as the "manifest objective in providing for collective bargaining." The Supreme Court will have to "eat" or explain away one of its statements.

BE these legal questions as they may, there are certain practical aspects to be considered if an employer desires satisfactory labor relations rather than test cases. If a collective agreement has been reached with the union, why not (other than to oppose the union) reduce it to writing? If there are a number of different wage scales, it is difficult to keep them all in mind without some writing—to say nothing of agreeing in a future dispute as to the exact understanding that was reached as to the rules governing layoffs, reemployment and assignment of work. Certainly, until the Supreme Court has decided the question:

Don't, in advance of agreement or disagreement, make a categorical refusal to sign a written contract if an agreement is reached.

My further advice to those required to make the decision in advance of the Supreme Court is:

Don't, if you do reach an agreement with the union, refuse to reduce this to the form of a written contract or insist on only posting a notice to employees of the terms without mention of the union.

The Act provides that collective bargaining representatives shall be selected according to the proper unit of employees—employer, craft, plant or subdivision thereof. Failure to bargain with the union for the unit claimed by it may bring a Board complaint if it is subsequently decided the union was right. So:

Don't fail to be careful as to the correctness of your position under the Board's decisions in opposing a union as to what is the proper unit for collective bargaining.

As the last but not the least:

Don't try to bribe union representatives, directly or indirectly.

So much for the "don'ts."

There is another point of view from which to approach this problem of dealing with unions. Under the "do" method:

Make every reasonable effort to reach an agreement just as you do when you are selling your product or when you are buying raw material or machinery.

The Labor Board has said that "a bona fide attempt by the employer to reach an agreement . . . is essential to collective bargaining." Independent of this, unsuccessful negotiations with a union representing a majority of your employees are bound to be an irritant to employer-employee relations. Satisfied workmen are just as important as the material and machinery with which they work.

Let the representatives of the union know that, although you are seeking the best terms, you are not fighting them or the union as such. You will receive more concessions from a man who isn't required to defend his right to be there. Perhaps this is part of the answer to the fact that, although defeated at every point, the union business agents mentioned at the beginning of this article have become friendly.

Seek what is necessary in the interest of your business in the way of wage rates, hours and other conditions of employment, but be fair if you expect the union representatives to be fair.

Fear not to fight unreasonable and unlawful demands of unions and of their individual representatives. Too many persons are inclined to thunder in the preface and then capitulate to any demand.

When you are making changes in your policies, such as bonuses, efficiency ratings, pensions, vacations or the like, take the union representatives into your confidence before public announcement. If an objection can be remedied you had better do so in advance than to retract or defend it later. Support of the union is better than opposition or even indifference.

If you cannot afford to have an employee devote full time to labor relations and labor law, retain outside help so you will not unwittingly be negotiated into a position where you will have to make concessions to avoid a complaint by the Labor Board. Labor officials are experts on collective bargaining for they devote all their time and thought to the matter. Management must divide its attention between mechanical problems of production, purchase of raw materials, sales, financing through credit and labor relations.

In addition there are some "mays" to bear in mind. You:

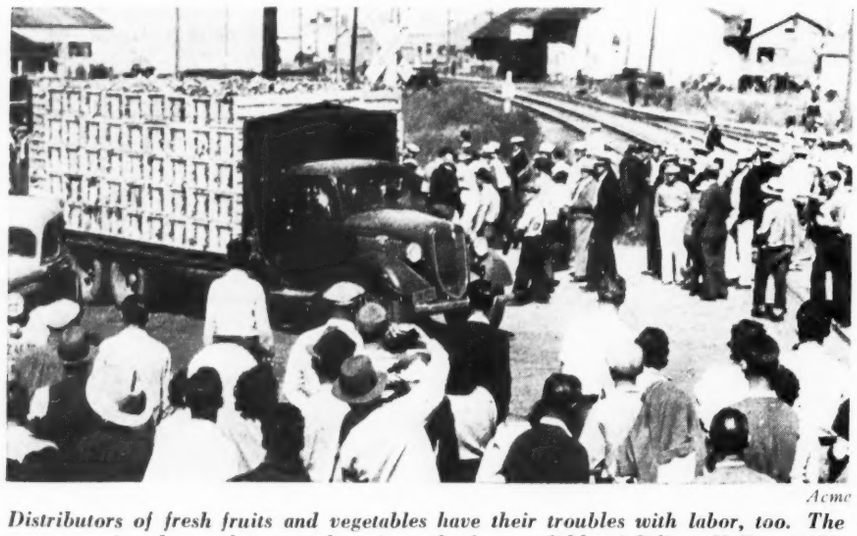
May refuse the closed shop or check-off.

May refuse wage increases.

May stop further bargaining after a bona fide effort has been made and the possibilities of reaching an agreement have been exhausted.

May refuse to sign a contract if the union insists on some term on which you cannot agree, such as a closed shop or check-off, and will not accept anything else.

It is difficult to follow exclusively the "don't" method without eventually getting into trouble. The Board may add a new "don't" in your case. Then, too, one who always sees how close he can skate to the line inevitably slips over sometime. In the long run the "do" method, with the "don'ts" and "mays" kept well in mind, will lead to the most successful labor relations.



Acme

Distributors of fresh fruits and vegetables have their troubles with labor, too. The men storming the truck are workers from the lettuce fields of Salinas Valley, Calif., who struck in 1936.

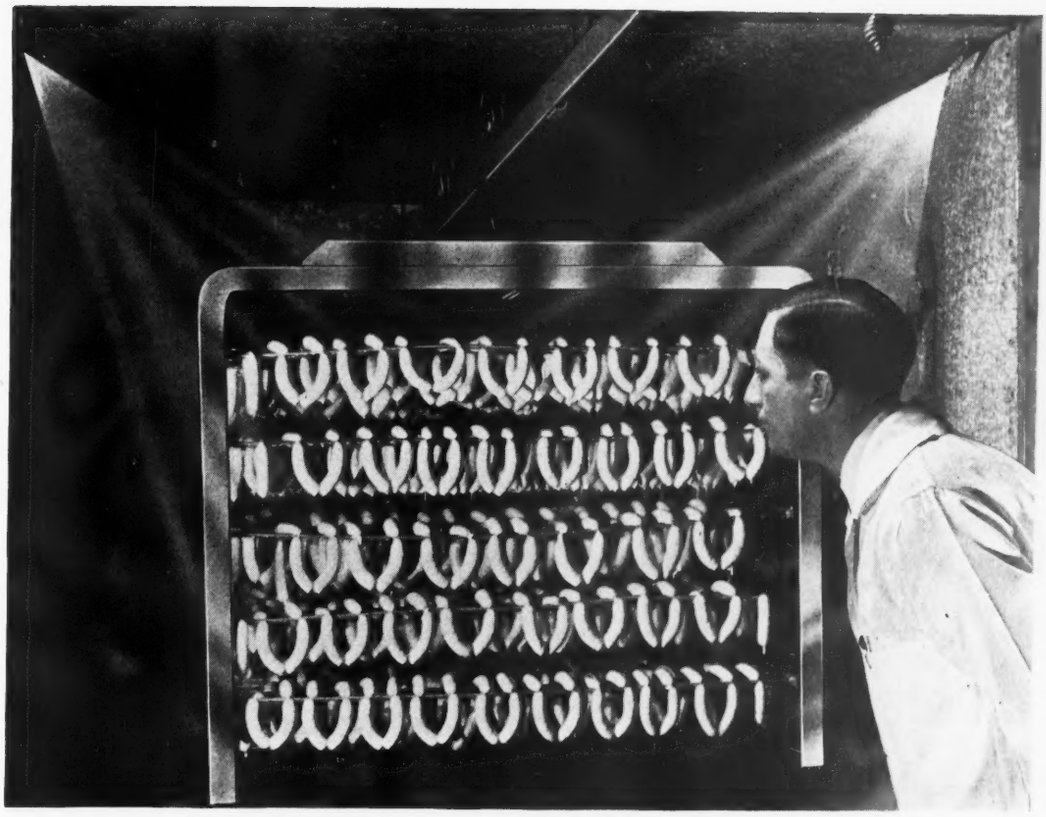
Short Time Pasteurization (A Correction)

At the request of Floyd M. Keller of Associated Milk Dealers, Inc., Chicago, author of "Short Time Pasteurization of Milk as It Looks to the Health Officer," appearing in April, 1940, FOOD INDUSTRIES on page 48, we are printing the following paragraph which was inadvertently omitted from the third paragraph of the third column of page 49.

Please clip this correction out and paste it onto the beginning of the third paragraph of the third column on page 49 of April, 1940, FOOD INDUSTRIES.

"The checking is done by adjusting the recorder to read correctly at the pasteurizing temperature. The controller is set so that the cut-in will occur when the recorder reads the predetermined minimum temperature during slowly rising temperature. The bulb is then cooled to room temperature and immersed in a can of agitated water, which is 7 deg. F. above the cut-in temperature. The maximum time required between the moment the recorder reads 12 deg. F. below the cut-in temperature and the moment of the power cut-in must not be more than five seconds. The interval between the moment of the power cut-out during descending temperatures and the moment when the forward flow of milk ceases must not exceed one second."

FOOD INDUSTRIES expresses its regret over the omission of important information.—The Editors.



As part of his laboratory control over production operations, C. A. Rinehart makes certain that the pineapple-juice spray strikes each of the several hundred frankfurts on the overhead trolley rack while under treatment.

Meat Packer Puts FRUIT ENZYME To Work

Uses proteolytic enzyme in pineapple juice to improve eating qualities of frankfurts and pork sausages

By
J. M. RAMSBOTTOM
and
C. A. RINEHART
Meat Research Division, Research Laboratories, Swift & Co., Chicago, Ill.

IN the tenderizing of animal casings stuffed with sausage meat we have the latest industrial utilization of enzymes. This development is only one more link in the chain of recurring evidence that the possibilities of enzymes are far from exhausted. Also, it adds another basis for the claim that, from the time of their discovery, enzymes have had their widest and most important industrial application in the manufacture of beverages and foods for human consumption. Their origin is biologic, and generally their action is specific. To make successful industrial application of their powers, exhaustive studies, both qualitative and quantitative in character, must be made. This new application is no exception.

After more than five years of searching for a means of increasing the eatability of large, or "dinner-size," frankfurts, an answer was found in bromelin, the proteolytic enzyme in pineapple juice. The enzyme has worked out so well on casings for these frankfurts that it has more recently been applied to the dinner-size pork sausages marketed by Swift & Co., under the "Brookfield" trademark.

This enzyme is only one of a group acting on proteins, and known as proteinases, which were investigated, along with non-enzymic methods, for improving the eating qualities of the animal casing so much a part of the frankfurt sausage. Its advantageous properties were determined only after it had been isolated from pineapple juice by methods involving adsorption, elution and precipitation with alcohol, acetone and inorganic acid salts.

After the effectiveness of the isolated enzyme dissolved in water had been determined, use of the pineapple juice became feasible. The application of the juice may be made by spraying the diluted juice as a fine mist upon the links or by immersing the sausages in the diluted juice.

The bromelin in the pineapple juice acts upon the natural proteins of the animal casings. By chemical action, it breaks down these complex

natural proteins into proteins of simplified composition which are less resistant to mastication and digestion. The degree of simplification and the rate at which it takes place are dependent upon several factors. To get best results, the strength of the juice used must be adjusted carefully.

After the frankfurts have been given the pineapple-juice treatment, they are smoked and cooked. During this processing, the temperature is gradually raised to 170 deg. F. to inactivate the enzyme.

The actual improvement in tenderness brought about by the pineapple enzyme treatment is indicated by tests made on frankfurts over a period of several weeks (Table I). Resistance of the casings to puncture was measured by a Bloom penetrometer (developed in our own laboratory) equipped with a 5/16-in. ball point. Since the instrument measures the pressure necessary to puncture the casing, the lower the penetrometer reading the more tender, or inversely, the less tough, is the casing. The penetrometer scale is calibrated to read in terms of 1/20 lb.

The readings of these penetrometer tests indicate that not only is the eatability of the frankfurts improved by the treatment but also that they give more uniform puncture-test readings when treated than when not treated.

The significance of this enzyme treatment of sausages in animal casings and its relation to other changes brought about in foods by enzymic action involves an understanding of enzymes and their action. Enzymes can best be identified by their individual properties because a more definite or direct means of identifying them by their chemical composition is not yet clearly established. It has been proved, however, that many enzymes are protein in character. A few enzymes have been prepared in crystalline form, including pepsin, trypsin and urease.

Enzymes are qualitatively defined as heat-sensitive organic catalysts produced by living cells. As catalysts, their presence induces chemical changes or speeds up chemical changes in other substances without the enzymes themselves becoming changed. Just as the double sugar, sucrose—cane sugar—is broken up or split into the two simple sugars, dextrose and levulose, by the chemically active hydrogen of an inorganic catalyst—hydrochloric acid—sucrose may be split into the same simple sugars by an organic catalyst, the enzyme invertase.

Neither the organic nor the inorganic catalysts are used up or destroyed in promoting these chemical reactions. If side reactions do not take place, the catalysts may be recovered unchanged when their work has been completed. They are capable of being used over and over without losing their activity. While enzymes change the rate of a chemical reaction, usually accelerating it, the change may be in reverse. Under certain conditions the sucrose-splitting enzyme, invertase, may catalyze the combination of dextrose and levulose to form sucrose.

While an increase in temperature increases the velocity of enzyme action, there is a limiting or an optimum temperature above which the velocity of the enzyme action is rapidly reduced. At 212 deg. F. enzymes in solution are quickly inactivated or destroyed. In that respect they differ from inorganic catalysts.

In addition to temperature changes, most enzymes are greatly influenced by the acidity-alkalinity reaction of the medium in which they act. Just as there is an optimum temperature for each enzyme, there is also an optimum hydrogen-ion concentration with upper and lower units of acidity and alkalinity above or below which the enzyme is inactivated.

Enzyme reactions may be accelerated by co-enzymes and activators, as for instance the effect of dilute hydrochloric acid on the activity of pepsin. Likewise, enzyme reactions are inhibited by anti-enzymes and other inhibitors, including heavy

This is an article on

PRODUCT IMPROVEMENT

It is of interest to

All Food Manufacturers

Because it illustrates how technological knowledge of one well-known food may be used to overcome technological problems in connection with other foods. By making a new industrial use of an enzyme common to a well-known fruit, a manufacturer of meat specialties not only improves the eating qualities of his products but makes readily usable animal casings of larger size than commonly employed for frankfurts and pork sausages.—The Editors.

After the pineapple-juice treatment, the dinner-size frankfurts are smoked, cooked, washed and cooled in the usual manner preparatory to being packed in 6 lb. cartons for marketing.

metals. These substances, if present, must be recognized and taken into consideration.

Also, enzymes show varying degrees of specificity. While invertase will not break down or split any sugar other than sucrose, certain proteolytic enzymes such as papain will act on a variety of proteins. Bromelin has its own optimum reaction medium in the acidity of the pineapple juice and in addition, under proper temperature conditions, will bring about the desired changes in the proteins of animal casings even though it is of plant origin. It, like papain, is differentiated from the proteinases pepsin and trypsin in that these are of animal origin. In addition to a large number of enzymes classified as proteinases, there are many other classes, including lipases, which attack or split fats or lipids; oxidases, which promote oxidation; and carbohydrases, which act upon carbohydrates with maltase, lactase and sucrase, also known as saccharase and invertase, acting specifically upon the sugars indicated by their names. Invertase indicates formation of invert sugar rather than splitting of sucrose.

Because every living cell contains enzymes of some character, there is an ever-increasing number of them being isolated or "discovered." Identifying them by name has been difficult, and there has been considerable disagreement because so little is known of their chemical composition and molecular structure.

The historical background of enzymes in industry in synonymous with the history of fermentation. While fermentation had early been associated with the production of alcoholic beverages, fermentaiton other than alcoholic was known. It included the leavening of bread by yeast action, the souring of milk by the formation of lactic acid from milk sugar, and the wide breaking down of plant and animal tissue with simplification in structure and composition. It was not until 1875, when Pasteur proved fermentation to be associated with the presence of microorganisms such as bacteria yeasts and molds—"organized ferments"—that enzymes received the identification of "soluble or unorganized ferments."

This double use of the term "ferments" led to confusion and to the suggestion that all "unorganized ferments" be termed "enzymes." When in 1897 Buckner eliminated the false distinction drawn between the organized and unorganized ferments, he opened the door to our present greatly extended conception of enzymes.

During the past 40 years many investigators have uncovered much knowledge regarding their importance in nature and in industry. The brewing and distilling industries are based on controlled enzyme reactions. In malting, the natural enzymes of the germinating grain change the grain starch to sugar. The sugar is in turn broken down into alcohol and carbon dioxide by the zymase of brewers' and distillers' yeasts. Enzymes present in flour and in yeast take an active part in bringing about changes in the making and baking of bread.

As a means of determining the action of the pineapple juice upon the sausage casing, J. M. Ramsbottom makes penetration tests with a Bloom penetrometer developed in the Swift & Co. laboratories.

In cheese making, the processing and ripening of soft and hard curd cheese depend upon the action of enzymes. Rennin is the enzyme which coagulates milk. There are other proteases and amalyases which improve the flavor. Acid curd cheese or cottage cheese is produced by the lactic acid curdling of milk. The lactic acid is formed from the milk sugar by the action of lactase, an enzyme produced by certain microorganisms.

In confectionery making, the enzyme invertase is employed in the controlled inversion of sucrose to dextrose and levulose—invert sugar—to bring about desirable modifications in flavor and crystallization.

In the manufacture of soy sauce and related products, the proteolytic enzymes and amylolytic enzymes of certain fungi or molds are utilized. The production of the sauce from the soybeans and wheat is a slow enzymic process often requiring a year for completion.

Table I—Average of Penetrometer Test Readings on Treated and Untreated Frankfurts.

No. of samples	Character of sample	Aver. reading	Deviation
140	tendered	75.7	11.9
140	not tendered	122.2	22.8

In the meat industry, the aging or ripening process applied particularly to beef for the purpose of improving tenderness and flavor depends for its success upon enzyme action. The natural proteolytic enzyme "kathepsin" present in beef and those produced by microorganisms are the active agents. Under controlled conditions of temperature, humidity and air movement, the cuts of beef improve materially in tenderness and flavor in the course of three weeks. This change is brought about by a gradual simplification of the complex proteins, particularly those of the connective tissues which hold the bundles of muscle fibers together. The connective tissue which is composed of complex proteins, including collagen and elastin, is broken down into more simple proteins, such as gelatin, a product of collagen.

The first application of enzymes for the tendering of meats is credited to the natives of Central and South American tropical regions. There, according to Kilmer,[1] the fruit juice of the tropical plant, *Carica papaya,* has long been used to improve the tenderness of meats. Slices of meat were rubbed with paya juice and stored until tendering action took place. In some cases the fruit was cooked along with the meat.

Within the last 10 years preparation of the juice from this plant and solutions of its active enzyme papain have been placed on the American market for the treatment of foods. According to the U. S. Department of Commerce,[2] 223,000 lb. of crude papain was imported in 1938 in comparison with 54,000 lb. in 1932. A limited quantity of this crude papain has long been used in medicine, but its greatest use in recent years has been in the manufacture of meat tenderizers.

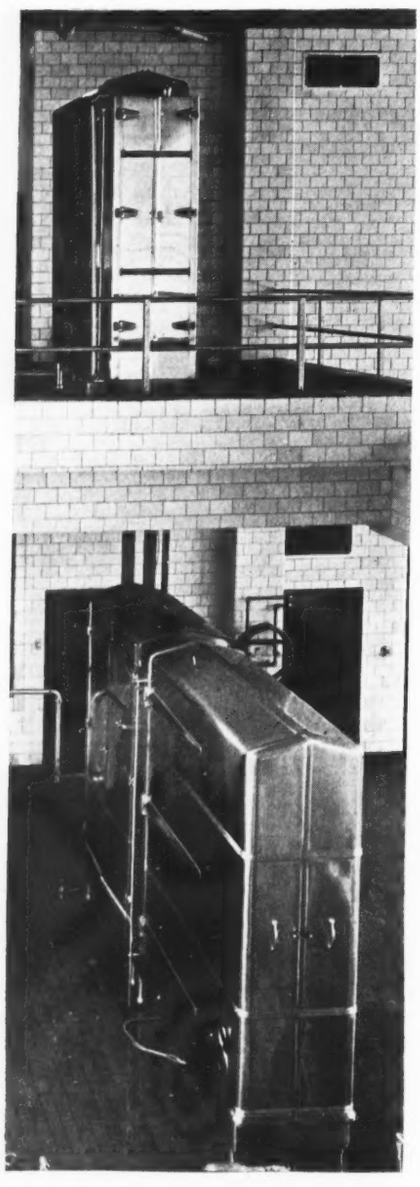
Treatment of frankfurts and other smoked sausages in animal casings with the bromelin in pineapple juice is the first industrial use of applied enzymes in the meat packing industry. Even in this instance, the casing containing the sausage meat, not the meat itself, is treated.

[1] F. B. Kilmer. The Story of the Papaw, *Am. Jour. Pharm.*, **73**, 272-285, 1901.
[2] U. S. Dept. of Commerce, Bureau of Foreign and Domestic Commerce. *World Trade Notes*, **13**, 166, 1939.

THE WAY TO CLEAN STAINLESS STEEL

By G. C. KIEFER
Research Laboratory,
Allegheny Ludlum Steel Corp., Brackenridge, Pa.

THE necessity for cleaning stainless steel is not usually due to the formation of any rust or corrosion products from the metal itself, but to surface contamination and deposits formed under the environment to which the equipment is exposed. Again, food manufacturing equipment is subject to various sanitation laws and regulations which demand certain cleaning and sterilizing methods. In most cases, proper care will preserve the original luster of the material and insure a permanent stain-free surface.



Stainless steel heat exchangers in the large, modern, fluid milk plant of Sheffield Farms Co., Inc., at New York.

The stainless steel commonly referred to is the alloy containing 18 percent chromium and 8 percent nickel, and these remarks are concerned only with the alloy of this composition.

Even though this alloy is resistant to the particular atmosphere or corrosive medium involved, other conditions often influence its behavior in service. In many food plants, stainless equipment has been installed directly under ordinary steel pipe lines. The rust or corrosion products from these pipe lines can then drop on the stainless equipment and, unless removed within a reasonable period of time, will stain the surface.

Again, the equipment may be set up adjacent to sewers where vapors may develop an iridescent film that is difficult to remove. Stainless decorative trim is frequently exposed to corrosion products from less corrosion resistant metals and washings from acid-treated insulating materials, which stain the surface or form hard deposits. Heat exchanger tubes and evaporators often become coated with mineral deposits from cooling water. Such deposits, unless uniform over the entire surface, are a source of localized pitting or corrosion.

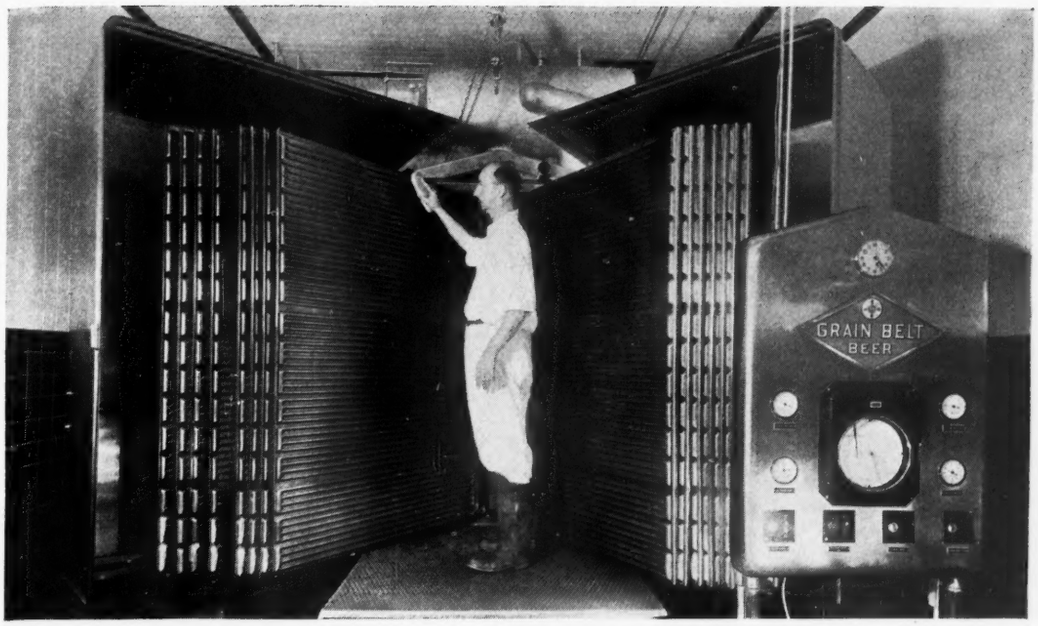
Rubber washers or gaskets that become saturated with the liquid encountered accelerate corrosion when in constant contact with stainless steel. In such cases, it is suggested that the equipment be taken apart often and any rust spots cleaned up. Painting the parts in contact with such materials with a good asphalt-base paint is also suggested as a remedy for this type of corrosion. These are but a few examples of troublesome conditions that require careful watching and necessitate frequent cleaning operations.

Because stainless steel is a solid metal and not a plating, frequent cleaning is more beneficial than harmful. If proper cleaning methods and materials are employed, the original luster remains unaffected indefinitely. The most suitable method and material will depend, of course, on the nature of the surface deposits. Probably the simplest procedure for removing ordinary deposits is frequent washing with soap and water. This prevents the deposits from becoming hard and tightly adherent, and subsequent cleanings are less difficult.

In industrial atmospheres, all metal surfaces soon become coated with deposits of dirt, coal dust, grease and so forth. While such deposits, if continuous, are not harmful, they tend to dull any bright polished finish if not occasionally removed. The luster of the polished finish can usually be restored with any of the stainless polishing pastes or powders available. Because of the large number of such powders and pastes on the market, precautions should be taken to use only materials of reputable manufacture that are definitely recommended for stainless steel. In some cases, the use of vinegar or dilute acetic acid instead of water increases the effectiveness of the dry powders. When vinegar or acetic acid is used, thorough washing with water should follow.

IN removing heavy accumulations, the use of harsh abrasives or scraping tools should be avoided. Deep scratches permit the lodgement of foreign matter and make cleaning difficult. Iron-free emery, of 180 grit or its equivalent, with kerosene as a lubricant, should be used when any abrasive is necessary. The use of any steel tools or files should also be avoided, as particles of iron are apt to become imbedded in the stainless surface and cause rusting.

More caution is required in sterilizing stainless steel equipment than in cleaning it. Most sterilizing compounds consist of, or contain, sodium



Cleaning stainless steel wort cooler in a brewery

or calcium hypochlorites. These hypochlorites should never be permitted to remain in contact with stainless steel for more than six continuous hours, and a thorough washing with water should follow each period of exposure. The type of corrosion usually encountered with the hypochlorites is entirely confined to small localized areas. This corrosion requires some time to start, and tests have indicated that four to six hours is required in contact with the hypochlorites. The number of cycles of exposure has no effect provided the surface is thoroughly washed after each period of exposure.

The cleaning of condenser or heat exchanger tubing or brine coils presents quite a difficult problem. Because of the many different types of construction, the cleaning of such equipment must be considered individually. In cases where construction permits, solutions of nitric, sulphuric or muriatic acid can be used for removing water, scale or other deposits that may form on the walls of the tubing. The most desirable acid solution for cleaning such stainless steel equipment is 10 to 20 percent nitric acid. Stainless steel is not attacked by solutions of nitric acid. Consequently, the acid solution can remain in the equipment for long periods of time without any harmful effects. Nitric acid cannot be used, however, if ordinary steel, brass, bronze, nickel or any material that is soluble in this acid is present in the system.

Solutions of sulphuric or muriatic acid with an inhibitor added are also occasionally used. In using these acids, it is essential that they be permitted to remain in contact with the stainless steel for long periods of time, and in every case the solution should be circulated rather than allowed to remain stagnant. It is also necessary, particularly where muriatic acid is used, to follow the acid cleaning with a thorough washing with water, because chloride salts are effective pitting media.

Removal of scale or other deposits from tubing by mechanical means should be carefully carried out. Most mechanical cleaners are constructed of steel, and every care should be taken to prevent the cleaning tools from gouging the stainless surface during the cleaning operation. It is, accordingly, much safer to employ small tools, manually operated, that can be conveniently handled.

In general, the cleaning of stainless steel does not differ greatly from the cleaning of other metals, except for the materials used. In most cases, neglect is responsible for the corrosion troubles occasionally encountered. The advantages of the corrosion and tarnish resisting properties of this alloy will be more fully obtained if the metal is maintained clean and free from surface contamination.

IN closing it might be well to point out briefly the effect of treatment with nitric acid on the surface of stainless steels. Short-time immersion in (or washing of the surface with) relatively dilute solutions, of concentrations in the order of 15 percent by volume, contrary to some opinions, does not constitute a passivating* treatment. However, such a treatment is advantageous in that it removes metallic surface contamination and foreign matter adhering to the surface as a result of contact with machining tools and drawing dies, and its use is to be encouraged. In order to properly passivate the surface of stainless steel, to such an extent as to increase its resistance to general solution in corroding media that would under normal conditions cause solution of the metal, a more effective treatment must be applied. The treatment necessary would depend on the corroding media. For example, the solubility of stainless steel in hot sulphuric acid can be appreciably reduced over a considerable period of time by boiling it in 50 percent nitric acid for approximately one hour. A boiling 3 to 5 percent solution of sodium dichromate will accomplish the same results but requires a 48 hour treatment. On the other hand, a 30 minute treatment at 140 deg. F. in an aqueous solution of 4 percent hydrofluoric acid and 4 percent chromic acid increases the resistance of stainless steel to localized attack in solutions containing chloride ions. Such treatments are truly passivating treatments. However, it should be pointed out that passivating treatments are not permanent, and reactivation of the surface can occur as a result of any condition that destroys the film, such as bending, scratching, immersion in acid solutions into which nascent hydrogen is evolved, or a sufficiently long immersion in reducing solutions.

* Passivation is the process by which a tightly adherent film forms on the surface of a piece of metal. This film is so thin that it does not change the appearance of the metallic surface but protects it from certain kinds of corrosion.

How To Prevent Browning of Peaches In The Freezing Industry

Part II*

By J. G. WOODROOF
Food Technologist,
Georgia Experiment Station
Experiment, Ga.

Effect of Metals or Salts on Browning

SINCE peaches are naturally acid and must remain so throughout the entire process of handling and freezing (to preserve both yellow and red colors), and since they are likely to come in contact with various metals and salts which might be brought into solution, it was thought advisable to study the effect of common metals and salts on browning.

Rose *et al*[15], in studying apples, found that tenth-normal solutions of the chlorides of K, Na, Li, Cs, NH_4, Ca, Mn, and ferric Fe decreased oxidation; while it was slightly increased by the same strength solutions of the sulphates of these cations. The nitrates of K, Na, and Mg had no effect on oxidation, while nitrates of Ba, Mn, and ferric Fe decreased it. Oxidation was increased in the presence of tartrates, oxalates, citrates, acetates, and carbonates.

Acids which are already present or might be added in various steps of handling in the freezing process are: citric, malic, tartaric, hydrochloric, acetic or sulphurous; metals which might be present and dissolved are: iron, copper, zinc, tin, nickel or chromium. By reactions of these acids and metals more than a dozen salts are likely to form.

The following salts were dissolved in water in seven concentrations varying from 1 part to 1,000 parts per million: copper acetate, copper chloride, copper nitrate, copper phosphate, copper sulphate, copper tartrate, iron chloride, iron phosphate, iron sulphate, stannous chloride, zinc acetate, zinc chloride.

None of the salts in concentrations less than 100 parts per million influenced browning or bleaching. Above this concentration the chlorides caused bleaching during the first five minutes, which effect was lost in about 30 minutes. The nitrates, sulphates and tartrates increased browning, while acetates and phosphates were neutral. The increased browning or bleaching was caused largely by anions, while the cations had no apparent influence. Copper in the form of chloride caused bleaching, in the form of acetate was inactive, while as nitrate it caused browning.

The results indicate that no appreciable amount of browning of peaches should be experienced through handling in ordinary metal containers, when an abundance of water is used; and this possibility is greatly reduced by using only acid-resisting metals and alloys.

Effect of Heating on Browning

Most methods of peeling peaches (whether with lye, acid, steam or hot water) require the use of heat. Experience has shown that warm peaches brown faster than those that are cold; for this reason as little heat as possible should be used, and for as short a period as practical.

Kertesz[13] found that oxidases in peaches were destroyed at 212 deg. F. in 30 seconds; and at 176 deg. F. in 90 seconds. Woodroof[16] found that peach tissue heated to a temperature of 140 to 158 deg. F. darkened more rapidly and more intensely than that subjected to a temperature below or above this range. A higher temperature produced an objectionable, semi-cooked taste. Cruess *et al*[5] stated that a temperature of 180 deg. F. was sufficient to destroy the oxidase but could not be attained throughout the whole mass of peach halves without requiring too much time, and rendering the tissue too tender, for commercial practice.

To study the effect of temperatures on browning, a water bath was prepared which ranged in temperature from 32 to 164 deg. F. Freshly sliced peaches of white and yellow flesh varieties were placed in the bath sufficiently long to reach the temperature of the bath. They were then placed in white dishes and the amount of browning noted without any appreciable change in temperature (see Table III).

Browning was negligible from 32 to 50 deg. F., where it began and increased only slightly up to 96 deg. F. From 100 to 121 deg. F., the tendency to brown increased very rapidly, reaching a maximum at about 125

Table IV—The Tannin Content of Peaches*

Variety	Fertilizer P-N-K	Tannin (percent)
Brackett	– –	.074
Elberta	8–4–4	.074
"	8–4–6	.084
"	8–4–14	.063
"	8–0–6	.074
"	8–12–6	.084
Fertile Hale	– – –	.011
Georgia Belle	– – –	.063
Hale	– – –	.042
Mikado	– – –	.011
Palora	– – –	.032
Slappy	– – –	.021

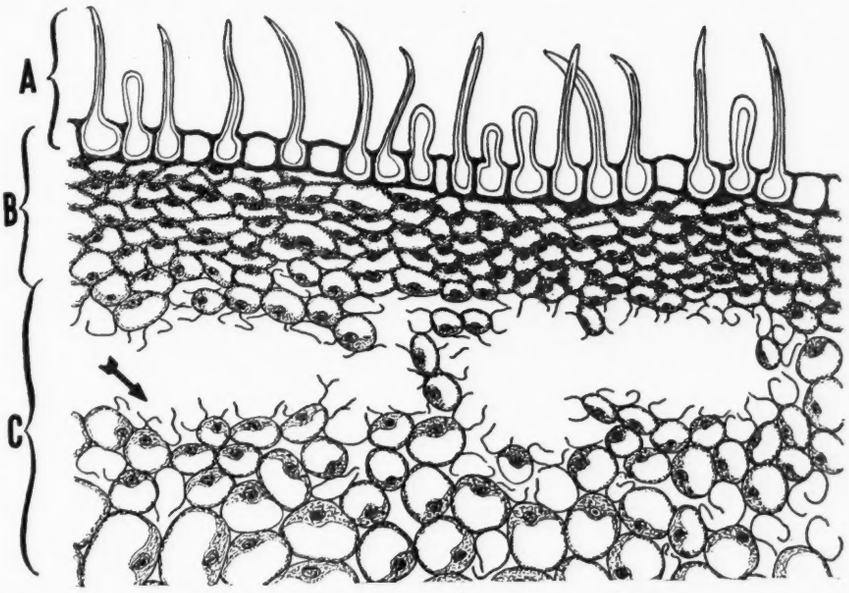
* Determinations by T. A. Pickett, Georgia Experiment Station.

Table III—Influence of Temperature on Browning and Oxidase Activity of Yellow and White Flesh Peaches**

Temp. (deg. F.)	Variety (Color)	Browning after 2-hr. exposure to air	Oxidase activity by gum guaiac test
	(Mikado)		
32	(yellow)	0	0
40	"	0	++
50	"	+	+++++
59	"	+	+++
78	"	+	+++++
87	"	+	++++++++
96	"	++	++++++++
105	"	+++	++++
116	"	++++++	+++
127	"	+++++++	+
140	"	+++++++	+
146*	"	– –	– –
164*	"	– – –	– – –
	Best May		
32	(white)	0	0
40	"	0	++
50	"	0	+++
59	"	+	+++
78	"	+	+++
87	"	+	+++++
96	"	+	++++++++
105	"	+++	+++
116	"	+++++	+
121	"	+++++++	+
130	"	+++++	– –
146*	"	– –	– – –
164*	"	– – –	– – –

* All red color (anthocyanin) destroyed, and cooked taste and smell appeared.
** The degree of browning or oxidase activity is indicated by the number of (+).

* *Part I of this article was published in* FOOD INDUSTRIES, *May, 1940.*



Showing cell rupture of a portion of an unfrozen peach that was bruised, and turned brown within a few minutes. It is doubtful if browning, due to oxidases, ever occurs other than in injured cells. "Internal browning" in frozen peaches follows cell injury throughout the peach mass, because freezing injures practically all of the cells. (a) Peach fuzz in the epidermis. (b) Tough skin that was uninjured. (c) Cells with tender walls were ruptured and browned badly. The cell contents from injured cells spread to adjoining uninjured cells causing them to appear brown.

deg. F. and remaining constant to 146 deg. F., where it suddenly stopped. Thus, 145 to 146 deg. F. appeared to be the thermal death point of enzymes which cause browning of peaches.

Oxidase activity, as tested by 5 percent gum guaiac in 95 percent alcohol, followed a quite different trend than did browning. There was practically no activity at 32 deg. F., but there was a considerable amount at 40 deg. F., increasing to, and reaching a maximum at 87 to 95 deg. F. Above this point, activity rapidly decreased until it finally stopped at about 145 deg. F.

The effects of length of time of heat treatments on browning of white and yellow flesh peaches were studied by using five temperatures from 100 to 140 deg. F., and ten intervals of each temperature. At 100 deg. F., browning increased steadily with an increase of length of treatment from 5 to 50 minutes. At 110, 120, 130 and 140 deg. F., the increased browning due to more lengthy treatments was successively less. With the last two temperatures, browning was almost as intense with 5-minute treatments as with 50-minute treatments.

Effect of Fertilizers on Browning

Elberta peaches were obtained from portions of the orchard that had received fertilizers containing varying amounts of nitrogen and potassium consistently for eight years. High nitrogen or high potassium fertilizers definitely reduced the tendency of peaches to brown, especially after freezing and thawing. Low nitrogen or no fertilizer increased browning.

Nightingale *et al*[13] found peaches from trees with high nitrogen fertilizers to contain less tannin (and consequently less browning) than peaches receiving low nitrogen fertilizers. However, as the two lots became soft ripe, the difference became insignificant (see Table IV).

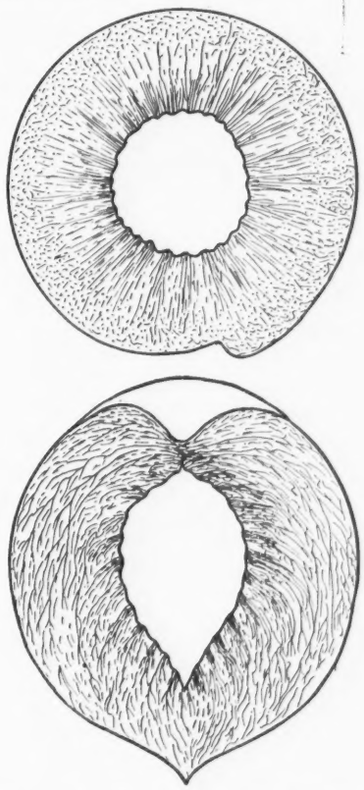
Increasing nitrogen from 0 to 8 percent was correlated with an increase in pH from 3.60 to 3.92; and a decrease in sugars from 13.1 to 12.5 percent. Neither of these effects is considered practically significant.

Effect of Storage of Peaches on Browning

It is often desirable to hold peaches fresh from the orchard for one to several days before freezing. This is desirable: (a) because firm ripe peaches become "mellow" in two or three days in the shade by all portions reaching very nearly the same degree of firmness and texture, and the flesh of mellow peaches has more "give" without bruising, enabling an experienced grader to determine whether individual peaches are ready to freeze or should be held for another day; (b) because peaches held until mellow peel much more easily than those fresh from the orchard, whether peeled by lye, acid, steam, hot water or by hand; (c) because several tests showed that peaches held in the shade for two or three days were less subject to browning after being peeled, than peaches held for more or less time.

Firm ripe peaches browned almost as readily fresh from the tree as at any time thereafter. When held at room temperature, the time of least browning was reached on the second or third day, but when held in cold storage the low point was in five or six days (see Table V). After these low points browning increased for the remaining life of the peach.

Culpepper *et al*[16] found tendency to turn brown decreased and flavor and texture improved with advancing ripeness of peaches; while extremely ripe fruit made a product that was too soft to freeze or can.



Showing the vascular system of a peach. Oxidizing enzymes appear to be concentrated in the cells of vascular bundles as these are the first to turn brown when a peach is cut. A freshly cut peach darkens first in dots or streaks. Freezing greatly increases the permeability of cell membranes and oxidases apparently diffuse to all cells alike, and browning (if it occurs) is uniformly distributed.

Variation Among Varieties as to Browning

There is a wide variation among varieties as to their tendency to turn brown. Kertesz[12] found that browning varied directly with the tannin content of the peaches, and that at

least one variety, the Sunbeam, was practically void of tannin and consequently did not turn brown.

Caldwell *et al*[4] placed 45 varieties of peaches in five classes on the basis of tendency to turn brown, texture and flavor. Unfortunately, several of the most desirable varieties for shipping fresh from southeastern United States, or for canning in southwestern United States, have a very low rating. But the fact that there are a few excellent varieties being grown, suggests that certain areas of these varieties should be planted for freezing.

We have studied 41 varieties at the Georgia Experiment Station and found five that had a high resistance to browning (see Table VI). Of these only the J. H. Hale and Rio Oso Gem are listed among one hundred most common varieties grown in the United States in 1939, according to a nationwide peach variety survey.[11] J. H. Hale is second only to Sunbeam in non-browning and third only to Elberta and Halehaven in popularity among growers, and is strongly recommended as a variety for freezing.

Twelve determinations of tannin were made and shown in Table IV. While the absolute amount is very small, the variation is wide. Under five fertilizer treatments the Elberta ran highest, while the Hale and Fertile Hale ran very low. The Mikado had a low tannin content and also browned badly.

The most popular varieties of yellow peaches, listed in order, are El-

(*Turn to page 102*)

Correction

A change should be made in Part I of this article, published in the May issue of FOOD INDUSTRIES. On page 36 of the May number, lines six to eight of the first paragraph should read: "This can be overcome by mixing about 25 per cent sugar with one-tenth per cent thiourea. . . ." instead of "This can be overcome by mixing about 25 per cent sugar with one per cent thiourea."—J. G. Woodroof.

References

1. A. K. Balls, and W. S. Hale (on peroxidases), Role of peroxidases in the darkening of apples, p. 3. Symposium on the chemistry of enzymes. Cleveland, O. 1934.
2. M. A. Blake, and O. W. Davidson, Some studies of maturity of peaches at harvest in relation to flesh firmness, keeping quality, and edible texture. *N. J. Exp. Sta. Bul.* 606, 1936.
3. H. H. Bunzel, The Mode of the oxidases. *Jour. Biol. Chem.* **24**, 91, 102, 1916.
4. J. S. Caldwell, J. M. Lutz, and H. H. Monn, Varietal behavior of strawberries and peaches preserved by frozen pack methods. *Amer. Soc. Hort. Sci.* **29**, 282–286, 1932.
5. W. V. Cruess, E. M. Mrak, and P. J. Quin, How to avoid the browning of peaches. *Conning Age* **16**, 353–354, 1935.
6. C. W. Culpepper, J. S. Caldwell, and R. C. Wright, Preservation of peaches for use in the manufacture of ice cream. *U. S. D. A. Tech. Bul.* 84, 1928.
7. F. E. Denny, Thiourea prevents browning of plant tissues and juices. *Boyce Thompson Inst. Cont.* **7**, 55-65, 1935.
8. B. D. Drain, Temperature and respiratory enzymes of apples. *Bot. Gaz.* **82**, 185–195, 1926.
9. J. P. Ferris, and R. B. Taylor, Immersion Quick Freezing. *Mechan. Engin.* June, 437–442, 1939.
10. W. Y. Fong, and W. V. Cruess, The effect of pH value on the inactivation temperature of fruit oxidase. *Plant Physiol.* **4**, 537–541, 1929.
11. Dean Halliday, Nationwide peach survey. *Amer. Fruit Grower.* Oct., 8–10, 1939.
12. Z. I. Kertsz, The oxidase system of a non-browning yellow peach. *N. Y. Exp. Sta. Tech. Bul.* 219, 1933.
13. G. T. Nightingale, R. M. Addoms, and M. A. Blake, Development and ripening of peaches as correlated with physical characteristics, chemical composition, and historical structure of the fruit flesh: II. Histology and Microchemistry. *N. J. Exp. Sta. Bul.* 507, 1930.
14. E. L. Overholser, and W. V. Cruess, A study of the darkening of apple tissue. *Calif. Exp. Sta. Tech. Paper* No. 7, 1923.
15. D. H. Rose, H. R. Kraybill, and R. C. Rose, Effects of salts upon oxidase activity of apple bark. *Bot. Gaz.* **69**, 218–236, 1920.
16. J. G. Woodroof, Preserving fruits by freezing—I. Peaches. *Ga. Exp. Sta. Bul.* 163, 1930.

Table V—Showing Effects of Storage on Sugar Content and Browning of Peaches

Storage	Days in storage	Variety	Total sugars per cent	Browning* Two hours after peeling	Browning* While frozen unprotected	Browning* One hour after thawing
Room 75–85°F.	0	Cumberland	9.1	+++	+	+++
	1		8.9	+++	+	++
	2		10.2	+++	++	+++
	4		10.6	+++	++	+++
	6		10.9	+++	+++	++++
	0	N. J. #46	10.1	++	+	+++++
	1		11.5	++	+	+
	2		9.8	++	+	+
	4		10.0	++	++	++
	6		10.3	++	++	+++
	0	Elberta	11.5	++++	0	+++++++
	1		11.9	++++	+	++++++
	3		12.0	+++	+++	+++++++
	5		11.7	++++	++	++++++++
	7		11.4	+++	+++	+++++++++
	0	Hale	10.0	+	0	+++++
	1		10.5	0	0	+++
	3		11.3	+	+	+++
	5		10.0	++	+	+++++
	6		12.9	+++	+++	++++++
	10		13.0	+++	+++	+++++++
	12		10.8	+++	+++	+++++++
Room 36–38°F.	0	Cumberland	9.8	+	++	++++
	3		8.8	+	+	++++
	5		9.7	+	+	+++
	7		9.2	++	+	+++
	9		10.2	++	+	++
	10		9.8	+++	++	+++
	12		9.9	+++	++	+++
	0	N. J. #46	9.5	+	++	++++
	3		9.1	+	+	+++
	5		10.4	+	+	+++
	7		10.4	+	+	++
	9		9.5	+	+	+++
	10		9.5	+	++	++++
	12		11.4	+	++	+++++

* The degree of browning is indicated by the number of (+)

Table VI—Data on Peach Varieties, Listed in Approximate Order of Ripening

Variety	Flesh color	Browning 2 hours after peeling*	pH of juice	Total sugars in juice, per cent	Ease of peeling
Mayflower	white	+	----	----	+++++
Mikado	yellow	++++++	3.65	---	+++++
Best May	white	++++	3.40	9.4	++
Dewey	yellow	++	3.85	9.0	++
Buttercup	yellow	++++++	3.70	----	++++
Rosebud	white	+++	3.75	----	+++++
Sunbeam	yellow	0	3.85	11.4	++++
July Elberta	yellow	++++++	4.10	12.9	+++
Babcock	white	++++++	3.90	11.0	+++
Cumberland	white	++++	3.88	9.0	+++++
Oriole	yellow	+++	4.17	11.0	+++++
Rochester	yellow	+++	3.78	10.2	++
Delicious	white	++++++	3.43	11.5	++++
Fair's Beauty	yellow	++	3.50	10.0	++
Pioneer	white	+++++	3.92	10.4	++++
Goldfinch	yellow	++++++	3.38	11.0	++++
Halehaven	yellow	++++++	3.72	12.8	++++
Slappy	yellow	+	3.95	11.5	+++
Veteran	yellow	+++	3.84	11.0	+++
Vedette	yellow	+++	3.89	8.9	++
Radiance	white	+++	3.58	12.8	+++++
N. J. 46B	yellow	+++	3.66	9.7	+
Eclipse	yellow	++	3.75	8.5	+++
Sun Glo	yellow	+++++	3.87	9.8	+++
Hiley	white	++++	----	----	++++
Ga. Belle	white	++++	3.51	12.2	+++
Elberta	yellow	++++++	3.48	11.3	+++
Fertile Hale	yellow	+++	3.63	11.0	++
Brackett	yellow	+++	3.68	10.2	++++
Kettie	yellow	+++++	3.45	10.3	+++
Rio Oso Gem	yellow	+	3.83	12.0	+++
Sept. Mammoth	yellow	++	3.60	12.2	++++
Wilma	yellow	++++	3.30	11.0	++
Big Red	yellow	+++++	3.40	12.0	++++
Gage Elberta	yellow	+++++	3.70	11.0	+++
J. H. Hale	yellow	+	3.52	11.0	++
Palora	yellow	+++	4.15	8.4	+
Fitzgerald	yellow	+++++	3.45	13.3	++
Annabelle	yellow	+++	3.72	9.0	+++
Primrose	yellow	+	3.78	12.7	++++
Banner	yellow	++++		13.5	+++

Summary

Rating on browning	Number of varieties	Average pH of juice	Average total sugar in juice, percent
0	1	3.85	11.4
+	4	3.77	11.8
++	4	3.68	9.9
+++	11	3.80	10.2
++++	4	3.52	11.0
+++++	5	3.58	11.4
++++++	9	3.69	11.5

* The degree of browning is indicated by the number of (+)

Machine Grades Sizes By Weight

By HENRY W. YOUNG, *Portland, Ore.*

WHERE a raw material is of a character that permits mechanized operations it is possible to grade it for size by two methods. One method is to size-grade by dimensions. This involves passing the material over some form of sieve which has openings that are progressively larger. A variant of this method is found in apple packing establishments in the East where sizing is done by moving cross-belts with clearances such that objects of successively larger sizes are brushed off on to other conveyors leading to suitable receptacles. Another method applies elongated conical helical spirals made of felt.

Accuracy of sizing by the foregoing methods depends on uniformity of dimensions of the object being graded. Which means that irregular shapes, such as pears or elongated apples, will be graded irregularly, depending on whether the smallest dimension is presented to an opening of corresponding size at the proper location or sequence. Otherwise, if a larger dimension is presented to an opening that would be proper for a smaller dimension of the same object, the piece is carried on, ultimately to be classified with larger pieces. Because of this, plus the fact that most of the apples of the Northwest are not of the spherical type, a different method of size grading has been developed for the Northwest by Cutler Manufacturing Co.

Size grading by the Cutler method is really weight grading, for each piece of fruit is individually weighed and automatically deposited with other fruits of the same weight. In general, fruits of the same weight will have approximately the same dimensions provided they are of the same variety. By utilizing this principle of sizing, the possible errors of dimensional methods are avoided with irregularly shaped objects.

An actual installation employing this principle on apples necessarily embodies other functions as well, such as acid washing to remove spray residues, drying, packing, etc., which have no place in this discussion.

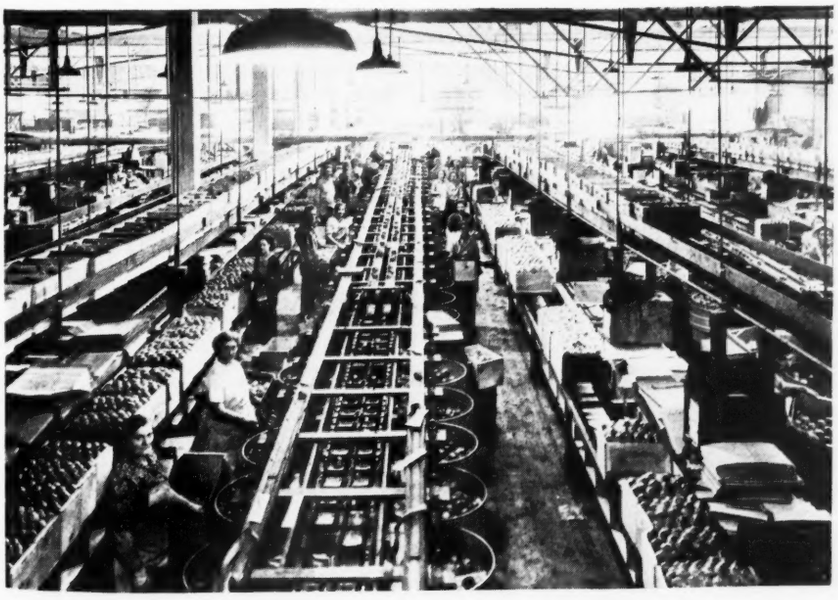
Size graders of this type are made up of a pair of long, continuous conveyor chains, located about 18 in. apart and carrying a series of crossbars at intervals of 8 in., extending between the chains. Attached to each bar are two carrier "cups" of heavy wire covered with canvas. Apples are fed to each cup by an automatic feeder at the entrance end of the grader.

As the conveyor moves the loaded cup along the machine, it is held in horizontal, non-dumping position by a steel finger at the end of the cup away from the crossbar. This finger rests on a carrier rail at the side, parallel to the line of travel of the cups. Thus the combined weight of cup, apple and finger is carried on the rail.

At regular intervals along the carrier rail are gaps, where the rail is replaced by the inner bar of a balance scale set flush with the upper surface of the rail. Each scale is set to a selected weight, progessing from heavier to lighter, and when an apple comes along having sufficient weight to trip the scale, the steel finger drops and the apple rolls out into the proper receptacle for this size of fruit. The scale mechanism is automatically reset when it passes the point.

Fruit which are dropped out roll down several buffered steps and fall gently onto a canvas apron in a slowly revolving bin. The purpose of the revolving character of the bin is to gently remove the fruit from the apron before the next one falls against it. Thus any bruising is avoided.

Power requirements for this form of grading operations are small. When size grading at the rate of 100 bu. or 2.5 tons per hour, the power needed is 1.5 hp. Carrier speed is 336 cups per minute. Tripping of the scale, discharge of the fruit, and resetting of the mechanism are practically instantaneous. Scale setting is easily changed while operating to meet any desired condition.



Automatic grading machine, installed in an apple packing house, is shown in center of this photograph. It grades apples, by weight, into predetermined size classifications as described in the accompanying article.

This article about

SIZE GRADING

Is of interest to

All Food Technologists

Because it gives the solution to a plant problem. Forget that the method described was developed for apples and see how the problem was licked by automatic weighing instead of sieving. There may be an idea here for pickle packers, for example.—The Editors.

How Quick Freezing Affects Keeping Quality Of Milk and Cream

By

C. L. ROADHOUSE

and

J. L. HENDERSON

Agricultural Experiment Station Division of Dairy Industry, University of California, Davis, Cal.

FOR many years there has been a demand on shipboard and in tropical countries for milk and cream that would retain the natural flavor during a long voyage or during a round-trip voyage from the food supply base. Fresh milk and cream held at the usual storage temperature of 40 deg. F. would deteriorate to the extent that it could not be used for human consumption.

With the more recent availability of satisfactory refrigeration facilities on shipboard, requests have been received at the College of Agriculture of the University of California for information concerning the best way to prepare milk and cream for freezing in order that it may retain its normal characteristics after storage and thawing for use.

Several years ago experiments were conducted by the authors in which milk was frozen in quart containers stored in cold air at 0 deg. F. The results indicated some of the factors necessary for the successful freezing of milk. It was concluded that the freezing must take place rapidly to prevent separation of the fat emulsion. Pasteurization was necessary to give a satisfactory flavor throughout a 30-day storage period at 0 deg. F. and homogenization was desirable to prevent the separation of the fat during this slow method of freezing. When cream was frozen slowly in cold air there was a physical change in the fat globule structure that caused small particles of oil to appear on the surface of hot coffee when the thawed cream was added to it. "Oiling off" of cream is caused by partial churning or by slow freezing.

More recently a method of freezing milk and cream in cans has been developed by Food Freezers, Inc. The equipment used for freezing consists of a horizontal cylindrical steel tank within which is mounted a steel drum equipped with paddles to propel the cans, which roll freely through the cooling medium during freezing (see "Quick Frozen Food in Cans," by Joseph M. Roush, FOOD INDUSTRIES 11, 10, 1939.) This arrangement provides for constant agitation of the contents of the cans during the freezing process and allows, in the frozen product, a uniform mixture of fat and other solids of the milk and cream.

The milk and cream used in the study were filled into 211x414 plain cans by the use of a Peerless displacement filler furnished by the Food Machinery Corporation. A headspace of $\frac{3}{4}$ in. was left in the cans for the expansion of the products when frozen. This allowed for a fill of approximately $11\frac{1}{2}$ fluid ounces.

The cans were vacuum sealed under 25 in. of vacuum. This was done to eliminate, as much as possible, any contact of the product with oxygen. The milk and cream were frozen immediately after the cans were filled.

The freezing medium was denatured alcohol maintained at a temperature of –25 deg. F. The freezer was operated at a speed of 35 cans per minute and the cans remained in the freezing solution for approximately 23 minutes. As the cans left the freezer they were placed in cases and stored at –5 deg. F.

The following products of selected quality were used in the freezing experiments: certified raw milk, pasteurized market milk, pasteurized market cream, pasteurized homogen-

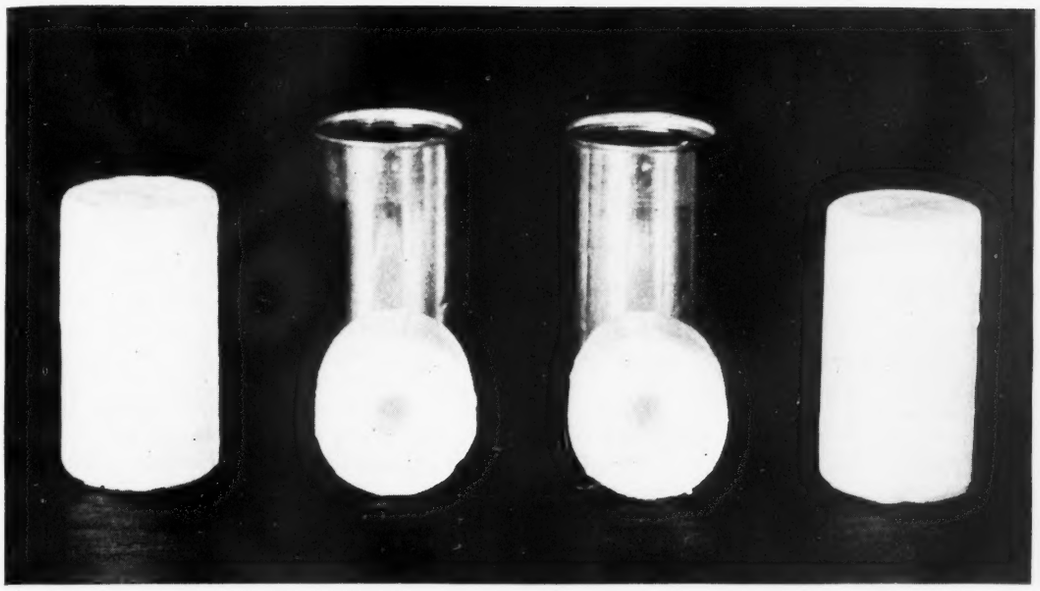
Table I—Milk and Cream Frozen in Food Freezers, Inc. Equipment

Products Frozen	Code Nos.	Bacterial counts per cc. before freezing	Bacterial counts 27 days after freezing	Bacterial counts after six months storage at —5°F.
Pasteurized market milk	M12P	3600		1500
Pasteurized homogenized milk	H12P	200		400
Pasteurized homogenized evaporated milk	E12P	200		200
Pasteurized homogenized cream	H12C	1700		7000
Pasteurized market milk	M11R		825	11000
Pasteurized market cream	M11C		5000	11000

Table II—Bacterial Counts of Frozen Milk Products Stored at 40 deg. F. After Thawing

Products Frozen	Code Nos.	Bacterial count immediately after thawing	24 hours storage at 40°F.	48 hours storage at 40°F.
*Pasteurized market milk	M12P	1200	1200	8000
*Pasteurized homogenized milk	H12P	400	400	450
*Pasteurized homogenized evaporated milk	E12P	300	450	500
†Pasteurized market milk	M11R	3700	21000	50000
†Pasteurized market cream	M11C	14600	16500	30000

* Bacteria counts made six weeks after freezing.
† Bacteria counts made nine weeks after freezing.



Frozen milk and cream after removal from cans. These samples were photographed within a few minutes after they were removed. The two samples in front of the cans were prepared by cutting through the center horizontally, the hollow centers resulting from the method of freezing in which the cans were rolled through the freezing medium. The frozen milk samples are on the right.

ized milk, pasteurized homogenized cream and pasteurized homogenized evaporated milk.

The unpasteurized milks became oxidized before the end of the third week and consequently further examinations of them were not made.

The condition of the products after storage at –5 deg. F. for six weeks is described as follows:

1. Pasteurized market milk (M12P) had a very good flavor, but was not quite equal in flavor to the product when fresh. Although the milk was not homogenized before freezing, there was no destabilization of the emulsion as was observed in the previous experiment in which slow freezing was practiced.

2. Pasteurized homogenized milk (H12P) had a good flavor, but not quite equal to the product when fresh.

3. Pasteurized homogenized evaporated milk (E12P) when reconstituted to the solids content of fresh milk by the addition of water had a flavor which was acceptable for commercial use.

4. Pasteurized homogenized cream (H12C). When the cream was warmed and agitated vigorously it had a normal consistency and a good flavor. The product did not thaw to a normal consistency without agitation, probably because of using too high a homogenizing pressure (1,500 lb. per sq. in.) before freezing.

5. Pasteurized market milk (M11-R). This milk secured from a separate supply than M12P showed a similar flavor and was of a good commercial quality.

6. Pasteurized market cream (M11-C) was of good commercial quality and would be acceptable for use in coffee or with cereal and other foods. The flavor, however, after the six weeks' storage was not quite equal to the fresh product. Although this cream was not homogenized there was no separation of the fat from the emulsion and one would conclude that there is no advantage to be gained by the homogenization of either milk or cream frozen by this method.

THE examination of the samples of frozen milk for flavor, bacteria and appearance were continued monthly for a period of six months. After the first six weeks had elapsed the flavor of all the samples changed somewhat and was considered less desirable, but still acceptable for table use. The bacteria counts remained low during the six months' storage period, which indicates that the slight flavor changes, after 6 weeks' storage at –5 deg. F. are chemical (including enzymatic) rather than bacterial (see Table I).

The rate of bacterial growth in the frozen milk and cream after thawing was determined and the results are shown in Table II. There was no change in the flavor of the products during two days' storage at 40 deg. F. after thawing.

It is apparent from the results of these studies that proper pasteurized milk may be frozen by the quick freezing method described and retain a very good flavor and body for a period of six weeks. The wholesomeness of the product is retained as judged from the lack of bacteria development in the frozen product.

Properly pasteurized cream frozen by this method and stored at –5 deg. F. for six weeks was considered to be satisfactory for use on shipboard or in the tropics where fresh products would not be available. The flavor, however, was not quite equal to fresh cream. Apparently there is no advantage in homogenizing either the milk or the cream when this quick freezing method is used.

The quick freezing method of preserving milk is not regarded as a substitute for evaporated or dried milk. They each have their place as a food commodity. It is for use where the storage period need not be too long and where it is desired to have a product more nearly approaching the fresh product than is possible with either evaporated or dried milks.

The suggested six weeks' period for milk as the length of time of storage, referred to the length of time that the product was considered a satisfactory substitute for the fresh product. Of course, it was edible for a much longer period and many people would consider it still equal in flavor to evaporated milk, or reconstituted milks. The advantage of this product over evaporated or dried milks is its resemblance to the fresh product, and this advantage is lost after several weeks' time. The quick frozen milk is considered equal to evaporated milk or reconstituted dried milk even after several months of storage.

It is considered by the authors that this quick freezing method has a place in the dairy industry for preparing fresh pasteurized milk and cream for use on shipboard for long ocean voyages. The product should have a place also for shorter journeys or for emergency supplies where freezing rooms are available for the storage of the product.

WHAT THE USER WANTS In Edible Oils

By GORDON W. McBRIDE
Chemical Engineer, Washington, D. C.

This article on

RAW MATERIALS

Contains information useful to packers of

Canned Fish, Cooking Oils
Mayonnaise
Salad Oils and Dressings
Vegetable Oils
Similar Products

It tells briefly how to select an oil of desired flavor or blandness, and how to retain that flavor in the finished product.—The Editors.

ALTHOUGH the edible oils (as distinguished from the edible fats) represent only about 10 percent of the total domestic consumption of fats and oils, they occupy a position of greater importance in the food industries than that figure would imply. One of the reasons for this is that they are not only used as such for salad oils and for cooking oils, but are also used as packing media for various food products and as raw materials for a great variety of manufactured foods, among the most important of which are salad dressings. Another reason compelling attention is that the oils are chemically more active than the fats, that is, they are more susceptible to spoilage, and therefore require more than their share of technological consideration by the food manufacturer. The research which has been done on the oils, however, applies almost equally well to the relatively more stable fats which were discussed at considerable length in a previous article (Food Industries, Feb. 1940, p. 60 and March, 1940, p. 70*).

SELECTION of an edible oil for use as an oil is based principally on its flavor and flavor stability, and to a minor degree on its color and brilliance. In this country it is blandness or the lack of characteristic flavor that is preferred, however, whereas in many countries a strong or characteristic flavor is usually desired. Since flavor is a psychological reaction to the senses of taste and smell, prejudice is deep rooted. In the Orient crude soybean oil, though having a strongly characteristic beany flavor, is considered very satisfactory and pleasing to the palate. In southern European countries crude olive oil is considered much more desirable than the highly refined oil. These oils may be refined in such a way that part of their characteristic flavor is retained, or they may be refined to a completely bland oil. These facts illustrate how habits of whole racial groups as well as habits of individuals determine marketability of oils for food manufacture.

There is a recent trend on the part of oil producers in the United States, however, to emphasize the flavor characteristics of the various oils as being more rather than less desirable. Effort is being made, for example, to sell peanut oil because of the nutty flavor which it imparts to foods fried in it. Corn oil has long been refined to a comparatively bland or flavorless oil. Now there is discussion of selling the corn flavor as well as the oil. This is, of course, an effort to cultivate a flavor habit. It should not be thought a hopeless effort. Many other foods of strikingly new flavor have successfully created customer acceptance, ripe olives, for example.

One reason for this domestic preference for little flavor in the oils is that the oils have usually been used as constituents of other foods. If the oil has a distinct flavor, it may change or even obscure the flavor of the food with which it is being used. However, since most manufactured foods are flavored by a variety of spices, flavors, or seasonings, it is being logically argued that the oil flavor might well be one of those considered. Perhaps the day may come when the American palate will demand for certain purposes oils which are as highly flavored as those that are commonly used in many other countries. Certainly, the food oil producer must consider whether varied degrees of flavor may not be welcomed in the various markets which he seeks to reach.

Since flavor or lack of it in an edible oil is so important to the food man, the stability of this flavor or blandness must equally be considered. It goes without saying that a food manufacturer selling an oil-containing food with a particular flavor does not want that flavor to change before the consumer gets it.

There are at least two ways in which the flavor of refined oils may change, other than by absorption of an odor or a foreign flavor: This change in flavor may result from reversion, or the oil may became rancid. Obviously, neither phenomenon is desirable and considerable research has been undertaken in an effort to discover the cause and prevention of these changes. A great many preventive measures have been tried, but, so far, none has been universally successful.

Reversion of an oil, which is recognizably different from rancidity, is characterized by an unexplainable reappearance of odor and taste following refining. Different oils exhibit greater or less tendency to undergo reversion, soybean oil being perhaps most susceptible, especially if it is not properly refined. On the other hand, corn and cottonseed oils are but little affected and coconut and peanut oils exhibit practically no tendency towards reversion. A variety of names is used to describe the taste reverted oils, among them being "grassy", "fishy", "painty" and so on. Fortunately, with improvements in refining operations in recent years, the susceptibility of refined oils to reversion is being greatly reduced.

RANCIDITY is a more serious problem than reversion, principally because almost all oils are subject to spoilage from this cause, whereas reversion is characteristic of only a limited number of oils. Although to the finished product the effect is the same, that is an undesired flavor, entirely different methods of attack

* The date was omitted on the two pie diagrams on page 70 of the March issue. These are the *1937* dairy industries statistics. The date also was omitted on the chart on page 61 of the February issue. These are *1938* consumption statistics, prepared in this form by the Bureau of Raw Materials For American Vegetable Oils and Fats Industries.

on the problems are necessary. The resistance of the various oils to rancidity also varies, and here too peanut and coconut oils are among the most stable. Cottonseed, corn, and soybean oils are intermediate in this characteristic.

It is fairly well established that rancidity is usually an oxidation phenomenon. It occurs to the greatest extent, therefore, when the opportunity is greatest for the oxygen of the air to reach the oil. The presence of water or bacteria aids this undesirable reaction, and light is known to have a catalytic effect. Elevated temperature accelerates this change, as it does all chemical reactions. Contact with certain metals is also known to produce off-flavors. This is due in part to solution of minute traces of the metal in contact with the oil, and in part to a tendency of certain metals to catalyze oxidation. Copper, for example, is known to be bad, whereas tin and aluminum are comparatively harmless.

Rancidification is unfortunately an autocatalytic reaction; that is, the products of the reaction increase the rate of the reaction by which they are formed. The products of rancidification are usually a mixture of aldedydes, ketones, peroxides, and short-chain fatty acids. It is, of course, the presence of these compounds of unwanted flavor or odor which causes what we call rancidity.

A closely related natural cause of depreciation of flavor is hydrolysis, that is, reaction with water to split the oil into its constituent fatty acids and gylcerine. This unwanted reaction is accelerated by many of the same conditions which speed oxidation of the oil.

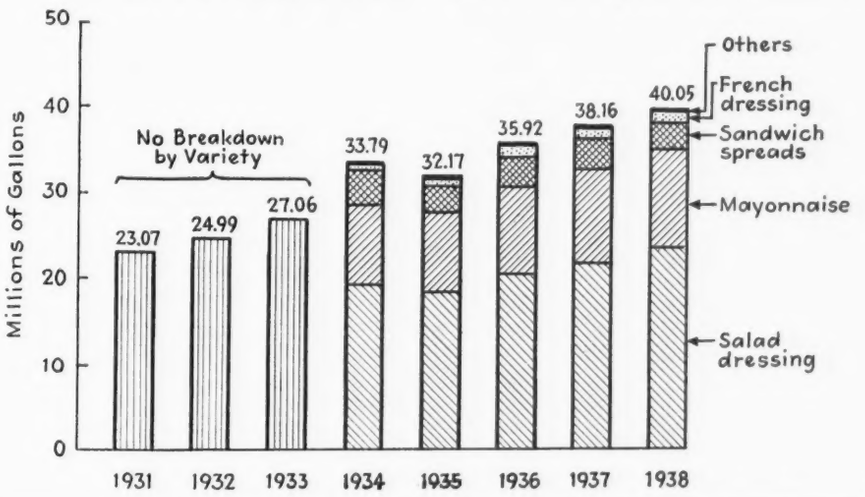
The obvious lines of attack on these problems by users of the edible oils, pending the development of more effective knowledge, have been sterile handling of the oils, avoiding contamination from all possible sources, metallic as well as bacterial, storing at low temperatures, keeping the oils as dry as possible and away from exposure to light, and using chemical inhibitors. Among these latter are ascorbic acid and related compounds (*Food Industries* **11**, 626, 1939,) sodium bisulfite (*Oil and Soap* **16**, 212, 1939) or phosphorous acid or some of its acid derivatives (U. S. Patents. No. 1,993,181 and No. 2,-104,242; see *Food Industries* **10**, 158, 1938), to name only a few. To be acceptable, any inhibitor must be effective in minute quantities. Antioxidants are of little value in preventing hydrolysis, of course.

Rancidity is usually not a problem with crude oils. In nearly all oils there is a natural anti-oxidant present which protects the oil for considerably greater length of time than the refined oils will keep. This observation has suggested to refiners that the ideal refining technic would achieve the desired color and flavor without destruction of the natural anti-oxidant. Considerable progress has been made in this direction, but much more is necessary for the attainment of the highest possible quality in the finished product.

*Production of Salad Dressings and Related Products—1931 to 1938

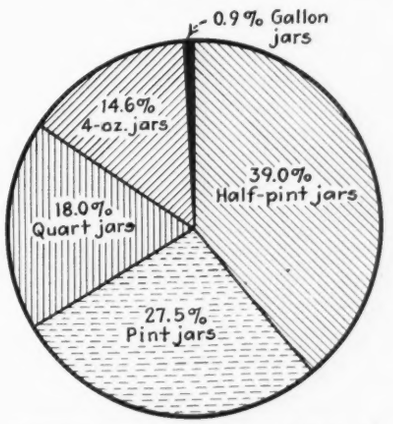
The effect on American industry of changes in the dietary habits of the American consumer is illustrated by the production of salad dressing, mayonnaise and related products during the past decade. As consumption of salad has increased each year, the consumption of salad dressing has kept pace. In 1938 this production reached record heights of over 40,000,000 gal., an increase of 5 per cent over 1937, the previous high year. The value of this production in each of these years (1937 and 1938) was about $50,000,000. The 5 per cent increase recorded in 1938 in sales quantity without a corresponding increase in value is explained by two factors: The volume of the lower priced dressings gained at the expense of the higher priced dressings, while the average price of each of the more important types of salad dressings declined at the same time.

This chart is based on data released by the U. S. Department of Commerce.

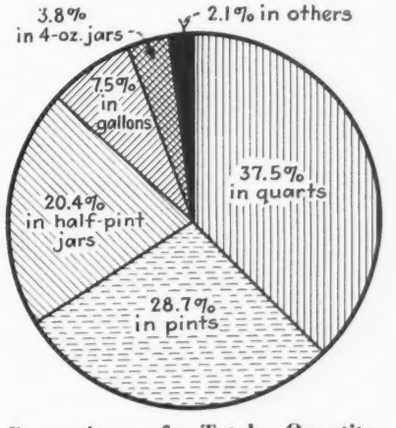


Salad Dressing Containers Used in 1938

The ½-pt. jar is the most popular size in the salad dressing industry. Although 40 per cent of the sales are made in this size, only 20 per cent of total production is packed in ½-pt. jars. The ratios are approximately reversed in 1-qt. jars, 18 per cent of sales being made in this unit, which accounts for 38 per cent of production. Pint jars are 28 per cent of all containers and account for 29 per cent of the production. The remaining production is packed in 4-oz., 1-gal. and larger sizes. Data for these two charts are from the U. S. Department of Commerce.



Proportion of Total Containers of Various Sizes. Basis: 275,000,000 containers (68 manufacturers)



Proportion of Total Quantity Packed in Various Sizes of Containers. Basis: 33,000,000 gal. (68 manufacturers)

It is particularly important that the food industries be supplied with oils of the desired flavor, color, and brilliance containing the maximum amount of these natural protective agents. It is very undesirable that resort be had to addition of such materials from other sources. The public acceptance of such oil with added stabilizer or anti-oxidant would naturally be much less readily achieved, even though the oil so "doctored" were actually chemically identical with one more skillfully refined to retain the natural protective agent.

It is felt by some that this natural anti-oxidant is the same chemical compound regardless of the oil in which it is found, while others believe that each oil contains its characteristic protective agent. Many of the large laboratories which are conducting research on fats and oils are making efforts to identify this constituent or constituents of the oils. Although the Regional Soybean Industrial Products Laboratory of the Department of Agriculture has made no official announcements, it is understood that considerable progress has been made there in this direction. By a concentration process, a quantity of the anti-oxidant has been obtained sufficiently concentrated for qualitative analysis, and some of its superficial chemical and physical properties have been examined. At present, efforts, are being made to produce the crude concentrate in sufficient quantity to permit more thorough investigation of its nature and properties.

The requirement of the Federal Food, Drug, and Cosmetic Act of 1938, that ingredients of manufactured foods be listed on the label, was at first thought to be a deterrent to the use of *any* anti-oxidants. Food manufacturers soon learned to turn obstacles into springboards, however, and may some day be advertising an oil as "containing sodium acidate—it keeps fresh forever"! (Note: *Acidate* is a coined word, not a typographical error for acetate.)

Table I—Imports of Foreign Fats and Oils

(Including Oil Equivalent of Seeds, Nuts, Etc.)

1938 and 1939

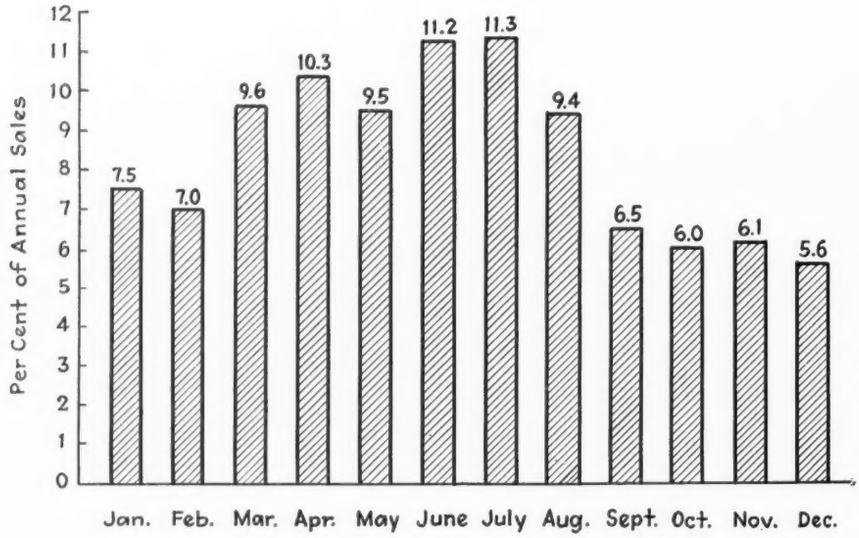
Imports during 1938 and 1939 changed considerably from the 1937 imports shown on p. 62 of the February issue.[1] [2] The import of Brazilian oiticica oil in considerable quantity has compensated slightly for the large drop in tung oil imports from the Orient. Brazilian babassu oil imports have more than doubled in the two years since 1937, but this has only partially offset the virtual disappearance of palm kernel oil. The return in 1939 to a surplus of domestic lard accounts for the decreases noted in imports of corn oil, cottonseed oil, peanut oil, and soybean oil. Sesame oil imports [2] are down because of the interruptions to normal trade occasioned by Oriental hostilities. Whale oil imports continue low as whalers find better prices in foreign markets where no import tax is imposed. Linseed oil imports in 1937 were abnormally high because of the low domestic production that year; 1939 imports were normal. All data from the Department of Commerce.

	Five-year average (1933–37)	1938	1939 (preliminary)
	(millions of pounds)		
Babassu oil	27 [3]	32	73
Castor oil	53	51	73
Coconut oil	633	687	608
Cod-liver oil	35	39	50
Corn oil	21	22	14
Cottonseed oil	163 [3]	78	29
Linseed oil	339	293	305
Oiticica oil	...	5	19
Olive oil (edible)	(103)	71	63
Olive oil (Inedible)	(103)	28	39
Palm oil	298	271	286
Palm kernel oil [1]	64	14	6
Peanut oil	38	16	4
Perilla oil	56	32	51
Sesame oil [2]	41	10	10
Soybean oil	11	4	4
Tung oil	132	107	79
Whale oil	35	22	20
Animal oils and fats, not otherwise specified	94	9	11
Fish oils, not otherwise specified	21	23	17
Vegetable oils, fats, and waxes, not otherwise specified	145	86	89
Total	**2309**	**1900**	**1850**

[1] Palm kernel oil imports in 1937 were 179 million pounds, and in 1931 were 39 million pounds. The total imports for those years were 2863 and 1834 million pounds, respectively.

[2] Sesame oil imports in 1937 were 44 million pounds, and vegetable oils, fats, and waxes, not otherwise specified, were 102 million pounds.

[3] Three-year average (1935–37).



Seasonal Sales of Salad Dressing

A little over 60 percent of the year's sales are made in the six-months period from March 1 to August 31 (the retail peak is from April 1 to September 30.) The chart is based on the average of six year's sales by 30 manufacturers. Data are from the U. S. Department of Commerce.

The food manufacturer chooses from the oils offered him for manufacturing purposes on the basis of many considerations, not the least of which is cost. His desire is to pick an oil medium for his packing, salad dressing, or other compounded food that gives the desired character to the finished goods (especially flavor) at the lowest overall cost. Whether it be the element of color, taste, brilliance, or emulsifying or shortening value, he is anxious to get this result with the saving of every nickel which can be conserved without depreciation of initial quality or keeping characteristic of his product. Many thousands of dollars are being spent on research to this end by both producers and users of food oils. Although each season brings new problems with changes in oil supply, progress of the scientist is encouraging.

IN conclusion, it should be thoroughly understood that fats and oils will always be competing with each other for the food market, whatever is added to the fat or oil, and in spite of what the label says. From year to year one oil may gain an advantage over another or may lose it, as research or weather or wars may affect market conditions and oil quality. By this means the food manufacturer may choose the oil best suited to his process or product. But the ultimate consumer reaps the reward: His food costs less, it suits his tastes better, and it's better for him.

HOW FOODS ARE FROZEN
In the Northwest

Latest operating practices and plant equipment

Part III

By F. W. KNOWLES

Manager,
Northwest Baker Ice Machine Co.,
Seattle, Wash.

IN 1938 National Fruit Canning Co., Chehalis, Wash., installed a pea freezing plant designed by Wm. Finnegan of Los Angeles. This company has been engaged in freezing for many years, starting in the "barrel" business in Chehalis and drawing berries from the famous Grand Mound territory. The Finnegan freezer follows the lines of other tray type freezers to some extent. It uses 10,000 sq. ft. of surface in semi-flooded finned coils placed on either side of the tray passage. Air is blown through the coils, over the trays, and again through the coils and back over the trays before returning to the fans. Considerable advantage is claimed from this "staging" of the air circulation.

The plant has a 40 hp. $7\frac{1}{2} \times 7\frac{1}{2}$ in. compressor, a 30 hp. $7\frac{1}{2} \times \frac{1}{2}$ in. compressor and a 15 hp. 6×6 in. compressor. The freezing area proper is 9 ft. wide, 20 ft. long and 5 ft. high. The entire unit is compact and well arranged, air distribution being particularly good. The owners originally asked for a plant designed to freeze about 12 to 15 tons of peas per day. No figures are available as to the exact quantities frozen.

This is called a multistage freezer and has six stages. These stages consist of a precooling area, four freezing areas and a produce tempering area. A high velocity of air is maintained through the entire system. The fan is supposed to deliver about 30,000 cu. ft. of air per minute with a 10 hp. motor. Possibly it is delivering considerably less air than this, as the static pressure is quite high. A total of 105 hp. is available in the plant.

Like other tray plants of this type, a great deal of labor is involved in filling the trays, loading the trays on trucks and again unloading and dumping the trays after freezing.

A variation of the tray type freezer was installed by the Port of Seattle in the summer of 1938. This freezer was designed by the port engineer, George E. Treadwell, and is somewhat of a variation from other plants of this type. Seven thousand feet of $1\frac{1}{4}$ in. coils is placed on vertical headers in two banks. These are fed from an accumulator placed on the floor above, with an ordinary float valve feeding the accumulator. Due to the long distance from the engine room, it is necessary to have a large suction line to avoid pressure drop between the coils and engine room. This line is 4 in. in diameter and about 300 ft. long.

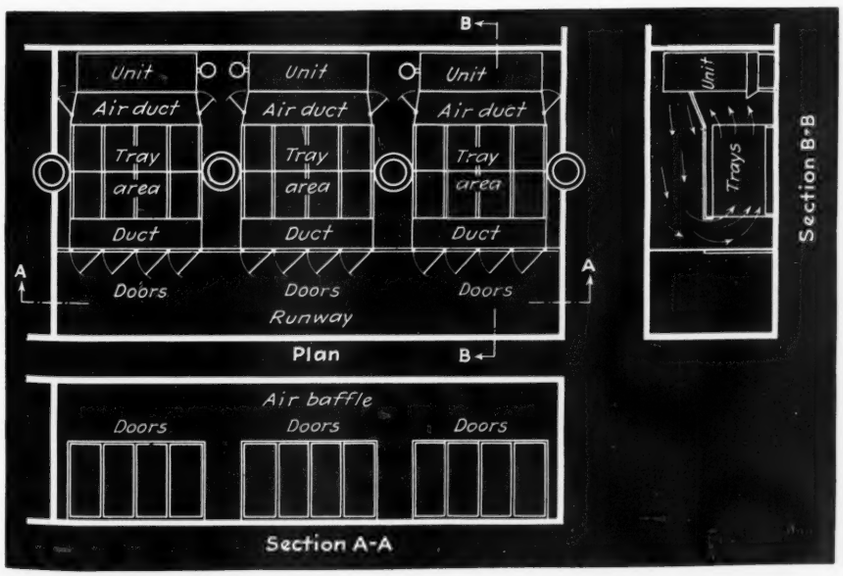


Fig. 5. A variation of the tray type air blast freezer, installed by the Port of Seattle and by Diamond Ice & Cold Storage Co. and American Packing & Provision Co. It freezes one ton of peas per hour.

This report on

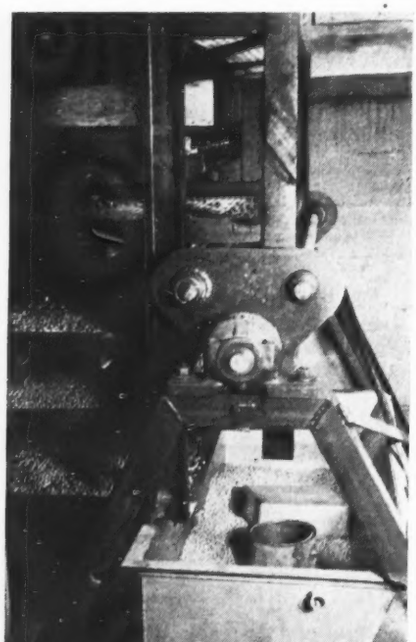
QUICK FREEZING

Is of value to processors of

Fruits, Vegetables, Meats, Fish and Poultry

Because it describes the operations of the great food freezing industry of the Northwest. Practical operating information, data and drawings on the methods and equipment used are presented in the form of case histories.—The Editors.

Air is delivered to the coils from four 8,000 c.f.m. fans placed directly over the coils. Plywood air baffles are placed along the side of the coils, and each of these baffles is slotted to correspond with the spaces between the trays. So air is delivered through the coils, strikes these baffles, is diverted between the trays, thence lengthwise of the trays and finally up and overhead and into the fans. This arrangement is similar to the cabinet freezer of Diamond Ice & Cold Storage Co. and American Packing & Provision Co., shown in Fig. 5. Eleven spaces are arranged for trucks. Each truck is arranged for fifteen trays. The plant was intended to freeze one ton of peas per hour and operates in a quite satisfactory manner. It freezes up to this quantity without difficulty. Handiing is somewhat difficult, due to the fact that quarters are close and cramped and it is necessary to wheel trucks of trays in over the same area where frozen peas are being carried out on the trucks.



Closeup of "wrist-plate" on vibrating-screen freezer. (See also Fig. 6.)

THE plan, however, is a departure in the method of baffling, and this aids considerably in the air distribution. As the pea freezing unit is attached to a very large plant, segregation of horsepower and actual capacity of the equipment used in the plant would be rather difficult to do. Without doubt, the total horsepower requirement is low, as air distribution is exceptionally good and the coils are well arranged.

A recent complete new plant installed in the Northwest is that of Cascade Frozen Food, Inc., at Burlington, Wash. This plant follows somewhat the design of the equipment installed for Bozeman Canning Co., at Monroe, Wash., with the exception that the coils are galvanized fin-type 1½ in. pipe, with horizontal headers. These coils are arranged with a York liquid ammonia recirculating system and intermediate receiver. A 20,000 c.f.m. fan handles the air for the freezer belt. This belt is 36 in. wide and 40 ft. long, arranged with standard gear reduction. Horsepower of the belt, however, is small, only a 1 hp. motor being required to drive the belt. The plant was arranged to freeze one-half ton of peas per hour but reached the capacity of about 1,300 lb.

The high side equipment consists of one 9 x 9 in. two-cylinder York ammonia compressor driven by a 60 hp. motor, and a 5 x 5 in. two-cylinder York compressor driven by a 20 hp. motor. The owners were thoroughly experienced in the cannery business and put up a plant which operates in a highly effective manner. It is extremely compact and uses a minimum of labor throughout the entire operation.

A few other plants of various types are in operation in the Northwest, but the foregoing discussion covers practically all features of these plants. Air has received a great deal of attention in the Northwest, perhaps more than in other parts of the country. It is, we believe, due to come into wider use all over the country. It is clean and flexible and, if properly applied, reasonably efficient.

Up to the present time, however, practically all equipment designed for

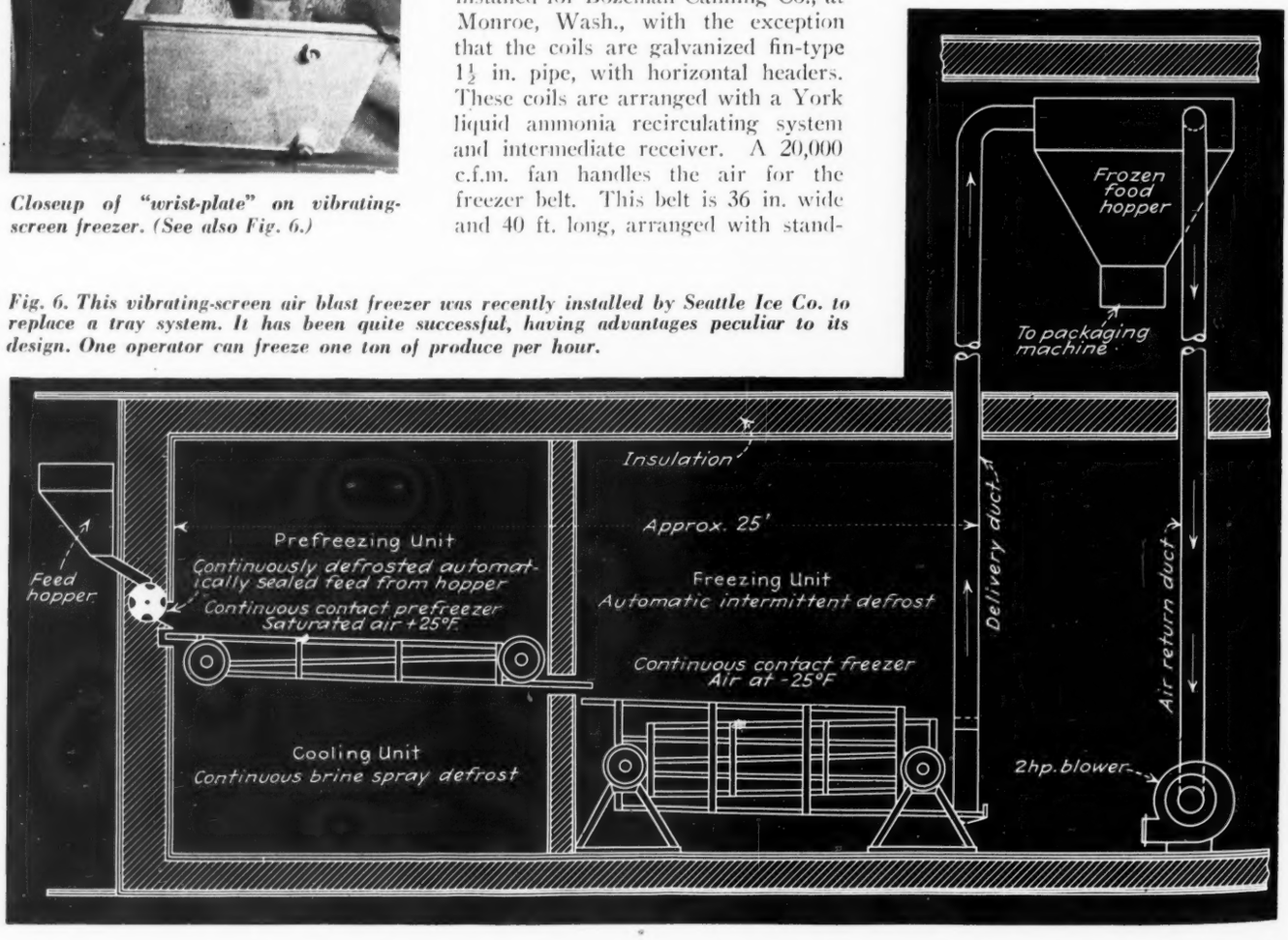


Fig. 6. This vibrating-screen air blast freezer was recently installed by Seattle Ice Co. to replace a tray system. It has been quite successful, having advantages peculiar to its design. One operator can freeze one ton of produce per hour.

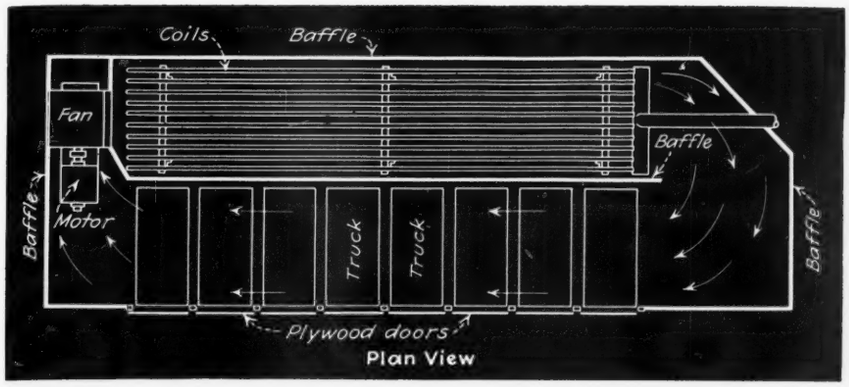


Fig. 7. Tray-type air blast freezer used by Seattle Ice Co.

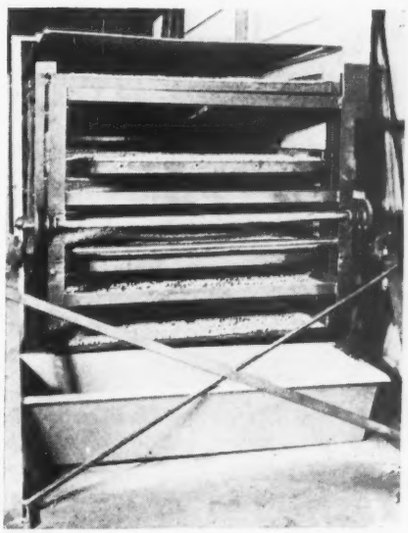
freezing in air has been arranged with the idea that the air must pass through a layer of the food. Attempting to blow air through a belt covered with peas is analogous to passing a stream of water through a cobblestone dam. The water piles up and some flows through the rocks, while the balance finds its way around the rocks obstructing the passage. In a quick freezer, pressure, and consequently horsepower, is necessary to force the air through a layer of peas on a belt or on a tray. In a very short time, the metal under the peas has picked up enough frost to make defrosting of the webbing essential. This frost accumulation further decreases the air flow, cutting down the original effectiveness of freezers of this type—which, at its best, is not good. In the tray type of freezers, where air is passed over the produce, insufficient turbulence decreases the flow of heat to the cold air, so that the temperature split is ordinarily very small. This factor makes for larger coils and greater horsepower, or lower pressure, to obtain the effectiveness required for quick freezing in an air type of freezer.

AGAIN, in a great many freezers of this type, those with small fans in particular, there is enough moisture on the incoming produce and in the air which filters into the freezing area to tightly block the small multivane fans (the only ones available) with frost in a short time. As this occurs and as the frost builds up on the webbing of the belt or on the trays, freezing time increases and effectiveness of the coils decreases. And to maintain anywhere near the freezing rate, it is essential that coils, fans and belts be defrosted, with a further loss of time.

Changes are bound to result from the foregoing difficulties. A plant installed for the 1939 season at the Seattle Ice Co., replacing a former tray arrangement, is shown in Fig. 6 and in accompanying photographs. In this system, heat passes from the produce to a metal screen and then to the air stream. The air, of course, also picks up heat from the produce, and naturally, will pick it up relatively fast because the produce is being moved forward gently with each vibration of the screens. This system consists of a high temperature, continuous defrosting, air blast unit; a vibrating-screen prefreezer; a low temperature, chill blast air unit; and a vibrating-screen quick freezer. Produce is fed through an air lock from the platform or wall of the room onto the prefreezer, where the sensible heat is taken out by a blast of saturated 25 deg. air. Free moisture carried on the produce at this point is frozen into a glaze before the food passes from the prefreezer onto the quick freezer. Here, again, the vibrating screens move the produce forward while it is being subjected to a flow of 25 deg. below zero air from the chill blast unit, which completes the freezing. The coating of ice frozen around the food in the prefreezer protects the produce against partial dehydration in the quick freezer. The produce comes out of the quick freezing area through another air lock into the packaging room.

On the vibrating shelves of the quick freezer, expanded surface is also used to aid in the transfer of heat from the produce to the air. Due to the fact that air is not being forced through the produce, but merely between fins attached to the vibrating screens under the produce, the horsepower of the fans is considerably smaller than in the ordinary freezer of like capacity.

Again, a better heat balance is obtained by taking the sensible heat out in a higher range unit, which allows the chill blast unit on the quick freezer to be operated with reasonable economy. It also eliminates the disadvantage of doing the quick freezing all in one stage and expecting to bring produce down to 0 deg. or lower in the same chamber that the produce enters at 50 or 60 deg. Accumulation of frost on the quick freezer is eliminated to a large extent by the fact that practically all of the air which might filter through the air lock type of feeder will be picked up in the continuously defrosted chill blast unit, and none of this moisture is passed forward into the quick freezer.



Peas being frozen on vibrating-screen freezer of Seattle Ice Co.

A large amount of space is saved over the ordinary belt. This vibrating screen freezer is about 5 ft. wide and 20 ft. long, while a one-ton belt is approximately 4 ft. wide by 80 ft. to 100 ft. long. Its chief advantage over tray freezers is the saving in labor, one attendant being able to handle a plant of this type freezing one ton of produce per hour, where it takes several people handling trucks and trays in the average tray freezer to handle one ton per hour.

The two-stage freezing should give an excellent product by sealing the material in its coating of moisture as soon as it enters the prefreezer. The produce has no opportunity to stick to a unit of this type, as it is moving from the time it enters until it is delivered out of the freezer. Turbulence is extremely high through the entire unit, without adding to horsepower. Air speeds as high as 700 ft. per minute are being used at present, with the counterflow principle being followed throughout.

This concludes a series of three articles on freezing methods employed in the Northwest. Part I appeared in April, Part II in May.—THE EDITORS.

DRYING METHOD Changes Composition Of Grapefruit Byproduct

This rotary dryer

By
GEORGE N. PULLEY
and
HARRY W. VON LOESECKE
U. S. Citrus Products Station, Bureau of Agricultural Chemistry and Engineering, U. S. Department of Agriculture, Winter Haven, Fla.

ABOUT thirteen years ago Mead and Guilbert of the University of California found that the dried peel of oranges was of value as a cattle feed[1]. More recently Neal, Becker and Arnold of the University of Florida have extended the work to include dried grapefruit peel[2]. As a result of the researches of Mead and Guilbert and of Neal, Becker and Arnold, the dehydration of cannery refuse has become an important industry in California, Texas and Florida. During 1938-39 nearly 2,500,000 lb. of the material were produced in Florida alone.

No extensive chemical analysis of the dried material has been published, nor has anyone studied the effect of the method of drying on the chemical composition of the dried waste. It is the purpose of this paper* to supply these data, as related to the material as it is produced commercially in Florida.

Methods of Preparation

The cannery refuse, consisting of peel, rag, and perhaps seeds†, contains about 85 per cent moisture. The first step in the process is the disintegration of the material and the removal of excess moisture so that there will result a saving in the heat required in the drying operation which follows.

The refuse is passed through a hammer mill or similar type of disintegrator and sprinkled with lime at the rate of approximately one or two per cent of the material. The limed waste is then allowed to stand, usually in bins, until the reaction is completed. The lime apparently precipitates part of the pectin and the waste develops a harsh, raspy feel. In this condition, the juice can be squeezed from it quite readily; in fact, during standing in the bins, syneresis seems to take place and a watery liquid exudes. In some instances ground oyster shells, dolomitic limestone, dicalcium phosphate, ferric oxide, copper sulfate and potassium iodide are added to build up the mineral content[3].

The limed material is next conveyed to continuous presses which may or may not be steam heated. Pressing releases more of the juice, which pours out as a dark brown liquid and may contain as much as 10 per cent total solids (consisting of sugars, pentosans, pectin, inorganic salts and naringin). At present, this liquid is discarded and constitutes a public health nuisance. Obviously, the press liquor represents some loss of nutrients from the finished feed.

The pressed material, now containing about 75 per cent moisture, is fed

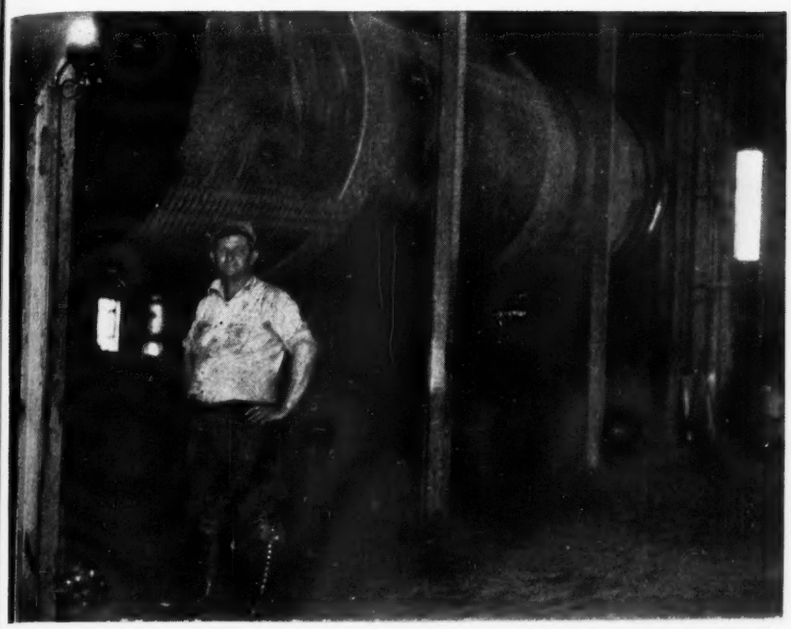
TABLE I—Composition of Dried Grapefruit Waste Commercially Produced in Florida

Constituent (Per cent)	Direct fired dryer	Direct fired dryer	Direct fired dryer	Steam tube dryer	Steam tube dryer	Atmos. drum dryer	Average*
Moisture	5.24	10.93	7.31	4.55	9.68	6.04	7.54
On a moisture free basis.							
Ash	8.22	5.94	6.65	5.23	6.44	4.28	6.50
Protein (N x 6.25)	6.84	7.03	7.00	6.76	7.55	5.70	7.04
Crude fat (ether extract)	6.46	5.56	5.37	4.98	7.33	3.81	5.93
Crude fiber	14.52	17.25	14.50	13.19	17.07	10.10	15.28
Pentosans	14.18	15.40	17.11	16.76	14.26	10.84	15.57
Non-reducing sugars, as sucrose	13.15	12.05	6.57	8.44	9.60	25.10	9.95
Reducing Sugars, as invert	2.63	3.73	2.69	3.32	2.98	7.98	3.06
Total Sugars	15.78	15.78	9.26	11.76	12.58	33.08	13.01
Pectin (alcohol precipitate)	18.00	15.11	16.90	22.02	15.35	17.93	19.70
Naringin	1.76	2.14	1.44	1.20	1.73	4.10	1.64
Potassium and sodium chlorides	2.18	2.21	1.95	1.69	1.70	2.67	1.94
Silica	0.91	0.041	0.16	0.019	0.12	0.03	0.25
Iron and aluminum ($Al_2O_3 + Fe_2O_3$)	3.14	2.47	1.36	0.59	3.05	1.51	2.10
Magnesium (Mg)	0.15	0.33	0.63	0.30	0.51	0.12	0.37
Calcium (Ca)	1.98	1.84	1.65	1.55	1.81	0.52	1.77
Phosphates (P_2O_5)	0.41	0.24	0.30	0.21	0.28	0.22	0.28
Sulfur (S)	0.14	0.17	0.13	0.067	0.057	0.053	0.11
Chlorides (Cl_2)	0.034	0.049	0.047	0.073	0.039	0.046	0.05

*Does not include feed produced by atmospheric drum dryer because commercial production is limited.

* Food Research Division Contribution No. 459.

† In some instances the seeds are separated and used for the preparation of oil.



is used in the production of cattle feed from citrus cannery wastes.

This article on

BYPRODUCT RECOVERY

Is important to

Canners

Dried Fruit and Vegetable Producers

Fresh Fruit and Vegetable Handlers

Powdered and Dried Food Producers

Other Food Manufacturers

Because it shows the importance of the method of drying in the final composition of the product.—The Editors.

to the dryers. These may be direct-fired or steam-tube rotary dryers. In the former type in Florida oil is used as fuel, the products of combustion being mixed directly with the drying air, the mixture of hot gases coming in contact with the material being processed. In the steam-tube dryer, the drying air and material are both heated by steam tubes within the shell of the dryer. It is claimed[4] that the steam-tube dryer can be more efficiently operated, permits drying at lower temperatures and produces a feed of higher fiber content and greater water-absorbing qualities.

Another method of drying, but not used as extensively as rotary dryers, is the use of an atmospheric drum dryer. The peel is mashed to a thick slurry and forced through pipes where it is given a preliminary drying of high pressure steam. The material is then fed upon the rolls of the dryer; the primary rolls carrying about 80 lb. of steam pressure and the secondary rolls approximately 100 lb. The dried material comes from the rolls in thin sheets which are subsequently broken up to a powder.

Where rotary dryers are used, the dried material is again passed through a hammer mill and then blown to a cyclone dust collector and then to the baggers.

Some feed manufacturers add blackstrap molasses (about 25 percent) to the dried feed to increase the carbohydrate content. Such feeds are not included in the analyses given in this paper.

Yields of 1 ton of dried material are obtained from 8 to 12 tons of wet. Lower yields will, of course, be obtained where pressing is excessive prior to drying.

Methods of Analysis

Samples of material were obtained from the drying plants and represent composite samples from about 15 bags of each lot of feed. All samples collected were of dried grapefruit. The samples were ground in a Wiley mill provided with a screen having holes 0.50 mm. in diameter, and stored in moisture-tight glass jars until ready for analysis.

With the exception of pectin, naringin and carotene, all analyses were carried out according to standard methods[5].

Pectin was determined in the following manner: A 5-gm, sample was extracted with 200 cc. of boiling dilute hydrochloric acid (10 cc. acid, sp. gr. 1.17–1.18, diluted to one liter, pH about 1.4) for ten minutes. One gram of diatomaceous earth was added as a filtering aid. The mixture was then filtered through a Buchner funnel using suction until the cake cracked. The extracted material was then removed as completely as possible from the filter paper, and boiled again for five minutes with 100 cc. of the dilute acid. The mixture was filtered as before and extracted eight more times making a total of ten extractions. The extract was transferred to a liter flask, cooled and made up to the mark with dilute hydrochloric acid. An aliquot (100 cc.) of the extract was then diluted with 225 cc. of 95-percent ethyl alcohol and allowed to stand for 30 minutes. The precipitated pectin was centrifuged at approximately 3000 r.p.m., washed twice with 95-percent ethyl alcohol and transferred, by means of a minimum amount of alcohol, to a weighed platinum dish and placed in an oven at 105 deg. C. When dried, the residue was weighed, ignited and again weighed. After subtracting the weight of the ash from the weight of the pectin, the difference was considered pectin.

Naringin was determined according to the method of Harvey and Rygg[6], modified to the extent of using comparison tubes in place of a colorimeter.

The presence of *carotene* was investigated using the method of Bolin and Khalapur[7]. None could be detected. In this connection, recent work by Futch, Rusoff and Becker[8] showed that dried citrus plup used in their experiments assayed less than 0.5 U.S.P. X1 vitamin A units per gram of pulp.

Attempts were made to determine ascorbic acid by titration, but extracts of the feed were so deeply colored that it was found impossible

(*Turn to page 100*)

References

1. Mead and Guilbert, *Univ. Calif. Agri. Expt. Sta. Bul.* **409**, 1926.
2. Neal, Becker and Arnold, *Univ. Fla. Agri. Expt. Sta. Bul.* **275**, 1935.
3. U. S. Patent 2,126,947 (1938).
4. Rosseau. *Food Ind.* **10**, 556, 1938.
5. *Assoc. of Official Agricultural Chemists, Methods of Analysis*, 4th Ed., 1935.
6. Harvey and Rygg. *Plant Physiology*, 11, 463, 1936.
7. Bolin and Khalapur, *Ind. Eng. Chem. Anal. Ed.*, **10**, 417, 1938.
8. Futch, Rusoff and Becker, *Journ. Dairy Sci.* **22**, 115. 1939.
9. Kirk and Tressler, *Ind. Eng. Chem. Anal. Ed.*, **11**, 322, 1939.

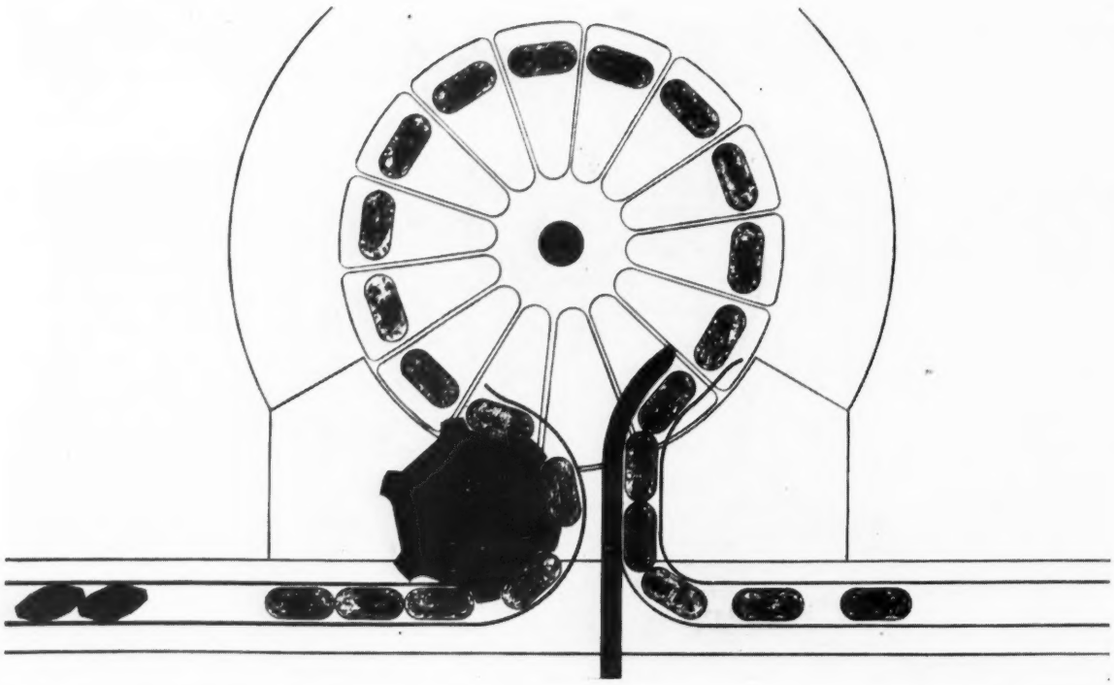


Fig. 1—Simplified "birdseye" view of the path of travel of bottles through a typical automatic-feed rotary filler. The bottle shape shown handles without difficulty. But improper shape will cause wedging in star wheel.

Proper CONTAINER DESIGN Speeds Liquid Filling

Certain characteristics in containers vitally affect production efficiency

By FRANK B. FAIRBANKS*

Secretary-treasurer, Horix Manufacturing Co., Pittsburgh, Pa.

PRODUCTION EFFICIENCY is vitally affected by the following container characteristics when filling liquids: (1) Shape of container; (2) size of neck opening; (3) filling height; (4) variety of containers to be handled on one machine.

Ever since our caveman ancestors began to make earthenware jars, the importance of providing containers with stable bases has been recognized. But that does not prevent the all-too frequent occurrence of bottles which tip over too easily for efficient handling by high speed automatic equipment. Of course, if the customer is willing to pay the cost, we will provide means of handling these unstable bottles, using conveyor chain with special pockets to keep the bottles separated, special form-fitting guides on the bottle lifts and special discharge turrets to transfer the filled containers from the bottle lifts to the discharge conveyor. But all of these special features involve higher initial cost, require more time and skill in making change-overs and usually cut down production speed.

I do not advocate the universal adoption of plain bottles of circular cross section. But I do contend that there is ample opportunity for the skill and ingenuity of the designer, even though he does bear in mind the fundamental fact that on high speed lines the bottles must touch each other as well as the guide rails, star wheels and so forth.

Careful attention should be paid to the cross section of the bottle, especially from about 1½ to 3 in. from the bottom. Fig. 1 shows a simplified "birdseye" view of the path of travel of bottles through a typical automatic-feed rotary filler. For higher speeds, a timing device may be provided at the infeed, and another star wheel at the discharge, similar to the infeed turret. You will note that the bottles are flask bottles, having an elliptical cross section, the major axis being much longer than the minor axis. This shape of bottle handles without difficulty. But if the major and minor axes are too close to the same, you are likely to have lots of trouble. The friction of the rail tends to turn the bottle in the pocket of the star wheel until it wedges, as you can easily see.

I have in mind two tapered gallon jugs of elliptical cross section, both of

* From a paper presented before the Packaging Conference in New York on March 26, 1940.

This discussion of

PACKAGING

Is of practical value to

Manufacturers of Fluid Products

All Food Engineers

Because it describes those characteristics in the shape of the container which contribute to, or detract from, production efficiency in filling the containers with fluid products.

—The Editors.

distinctive appearance. One jug, a product of one of our leading glass companies, is virtually impossible to handle automatically. The other, on the contrary, is being handled automatically without any difficulty. No. 1 has an elliptical cross section with about $\frac{1}{4}$ in. difference between the two axes. The designer of bottle No. 2, while achieving a distinctive appearance, has very skillfully provided, in the form of ribs, the necessary contact points equidistant from the center of its cross section.

A container which permits free flow of the liquid and unobstructed exit of the air from the bottle through the vent will obviously fill faster than one where the inflowing liquid tends to choke the air vent. In Fig. 2 you can see at a glance the advantages of the bottle at the left over that at the right.

To secure maximum production from a filler with a given number of filling valves, the size of the bottle opening is most important, because this determines the maximum diameter that can be used for the valves. The diameter of the valves should be at least 1/32 in. less than the Glass Container Association minimum bottle opening to permit proper clearances. While, theoretically, valves of any desired size can be provided, actually there are practical limitations due to the sizes of tubing of the desired wall thickness and material (stainless steel, pure nickel, etc.) which it is possible to procure and in a reasonable time. The most commonly used size is 9/16-in. diameter for bottles up to quarts, and $\frac{7}{8}$-in. diameter for half-gallon and gallon containers. Special size valves cost more because they are made in small quantities, and replacement parts may not be in stock.

Fig. 3, showing the cross section of a simple filling valve, illustrates the effect of a relatively small change in the outside diameter. The outer circle represents the outer wall of the valve, the inner circle the air vent tube. The liquid flows into the bottle through the black area and the air is drawn out through the hatched area. A slight increase in the outside diameter, while keeping the vent diameter the same, makes a relatively large change in the area through which the liquid flows. As an example of how much this may affect the filling speed, we recently tested a sirup with which a $\frac{1}{16}$-in. increase in diameter (from $\frac{9}{16}$ in. to $\frac{5}{8}$ in.) caused an increase in production of 25 percent.

Inasmuch as we have our own problems in getting the liquid into the container, we generally consider it outside of our province to worry about how the consumer is going to get the product out. But in passing, may I point out that this is a mighty important consideration for the package designer. Believe it or not, we have had several instances where catchup packers have sent us bottles which we could fill at the normal filling temperature of 175 deg. but which could only be emptied by breaking the bottle.

The filling height, which we define as the distance from the top of the bottle to the liquid level at time of filling, is likewise important. In general this should not exceed $3\frac{1}{2}$ in. Standard automatic rotary fillers are adjustable within certain limits, depending upon the type of filling valve, product and so forth. While machines can be built to give filling heights outside the usual range, this requires special cam tracks and special filling valves, making them more expensive. In addition, there is a decrease in filling speed in order to provide excessive filling heights, as

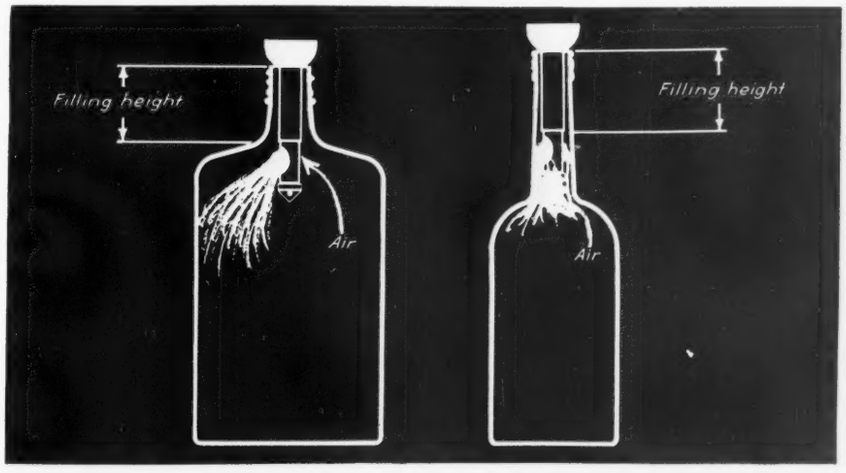


Fig. 2—A container which permits free flow of liquid and unobstructed exit air (left) will obviously fill faster than one where the inflowing liquid tends to choke the air vent (right).

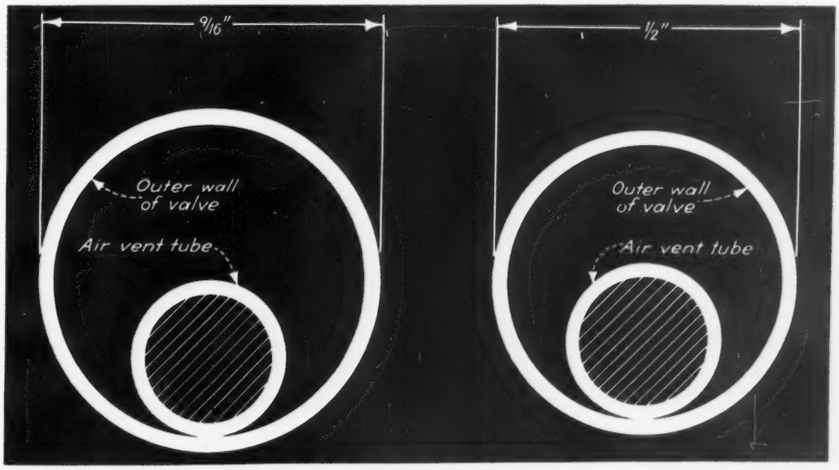


Fig. 3—Cross section of simple filling valve, illustrating effect of a relatively small change in outside diameter. A slight increase in outside diameter, while keeping vent diameter the same, makes a relatively large change in the area through which the liquid flows.

you will readily see from Fig. 4.

This figure represents the contour of the cam track which lifts the bottle into filling position. The lifter starts to rise at point *A*. With a standard track, there is a full liquid flow at point *B*. With a special high-lift track, full flow is not obtained until the lifter reaches point *C*. The distance from point *B* to point *C* represents the loss in filling time. A similar loss in filling time occurs at the discharge end.

To show this in another way, let us look at Fig. 5, another "birdseye" view. From *B* to *B* represents the arc of the circle during which filling is performed, (*a*) 215 deg. with a standard machine, and (*b*) 200 deg. with a special high-lift cam track.

I have shown how a high-lift cam track cuts down speed. On the other hand, a special cam track also points the way in which higher production may be obtained where containers demand only a low filling height and the extra expense of a machine with special low-lift cam track is justifiable.

THE use of too many sizes of containers raises packaging costs. Change-over parts cost money—also the time to make changes from one size to another. Hence, in designing a family of different-capacity containers, it is desirable to adopt similar shapes and dimensions so that as many sizes as possible can be handled with the same feed parts and rail adjustments. In this way, the number of parts required to handle the various capacities is kept down to a mimimum and the time loss in change-over is minimized.

I have briefly presented important factors affecting production speed. I realize that ideal conditions cannot be attained in each and all cases. Container design, like machinery design, necessarily involves numerous compromises.

I have no fault to find with the package designer or the customer who consciously decides that all considerations of efficiency may be disregarded because of limited production or high selling price of the product as compared with its manufacturing and packaging cost. But with many products, efficient packaging methods and the obtaining of the maximum production with a given investment is of vital importance. To package designer and men interested in filling such products, I particularly commend the foregoing fundamental principles for their consideration.

EDITOR'S NOTE: *Two additional factors affecting filling efficiency—foaming and viscosity—were brought out by Mr. Fairbanks in the discussion following the presentation of the foregoing paper. These follow:*

As you know, the great majority of liquid fillers operate on the principle of permitting the product to flow into the containers until the liquid level reaches a predetermined distance from the top of the container, at which point the filling automatically ceases. This affords an exceedingly accurate means of measuring out the desired volume of liquid, thanks to the remarkable uniformity of containers produced by our friends, the container manufacturers. However, to maintain this accuracy, any foam must be allowed to settle and the liquid level stabilize before the container can be discharged as fully filled. For example, a sugar sirup with which we are familiar requires 9 seconds to fill a gallon jug to approximately the right height, and 5 seconds more for the foam to subside and to complete the filling accurately.

Therefore, the quicker the foam subsides, the quicker the product can be filled. Liquids differ to a great extent in this matter of foaming. Different whiskies foam to a different degree, a spirit blend having less tendency to foam than a straight whiskey. In a recent test, it was found possible to obtain 25 percent greater production filling dry sherry than muscatel wine.

FOAM may be due to air or the gases dissolved in the apparently still liquids. The problem of minimizing the effect of foaming is largely up to the equipment manufacturer. However, it is a matter which the production manager should not overlook. Possibly deaeration of the liquid before filling, a subject of particular interest in the food field just now, may also permit higher filling speeds on the same filling equipment due to the reduction in foaming.

With regard to viscosity, which determines the rate of flow through the filling machine valves, there is not much that any of us can do about it except insofar as it can be changed by heating the liquid before filling.

Some liquids, especially oils and sirups, flow much more freely at temperatures higher than normal room temperatures. The optimum temperature must be determined by the customer, taking into consideration the possible change in flavor or quality of the product and the cost of heating as compared with the extra investment in filling equipment if the product is filled at normal room temperature. The importance of filling temperature may be judged from the fact that a product we recently tested could be filled on a certain machine 50 percent faster at a temperature of 180 deg. than at a temperature of 165 deg.

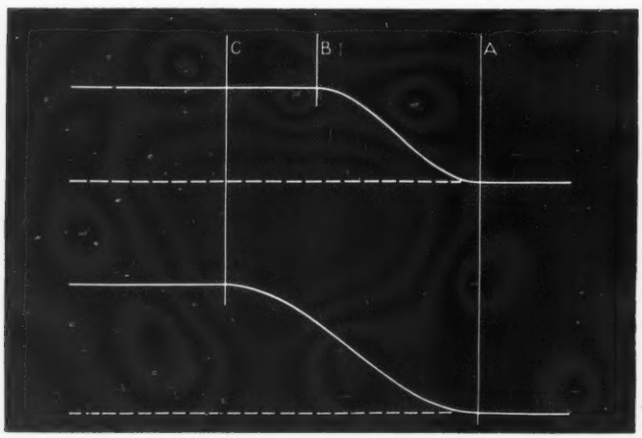


Fig. 4—Contour of cam track which lifts bottle into filling position. Full flow comes at "B" with a standard track; at "C" with a special high-lift track. "B" to "C" is loss in filling time.

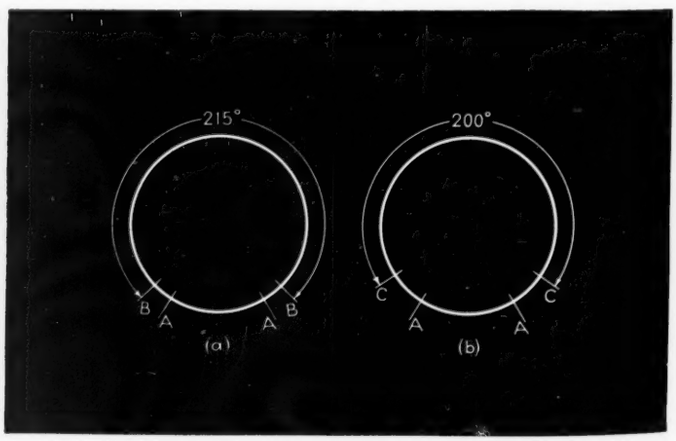


Fig. 5—"Birdseye" views of circles during which filling is performed with (a) standard and with (b) special high-lift cam tracks. There is a 15-deg. difference. (See also Fig. 4).

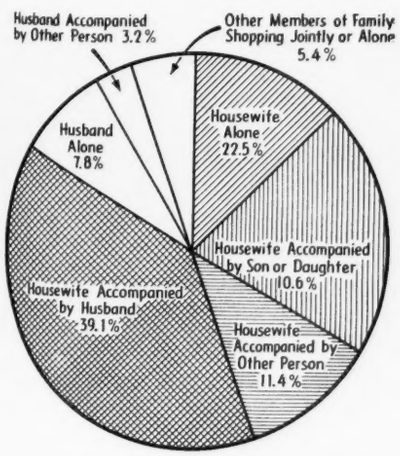
Hints and Hurdles

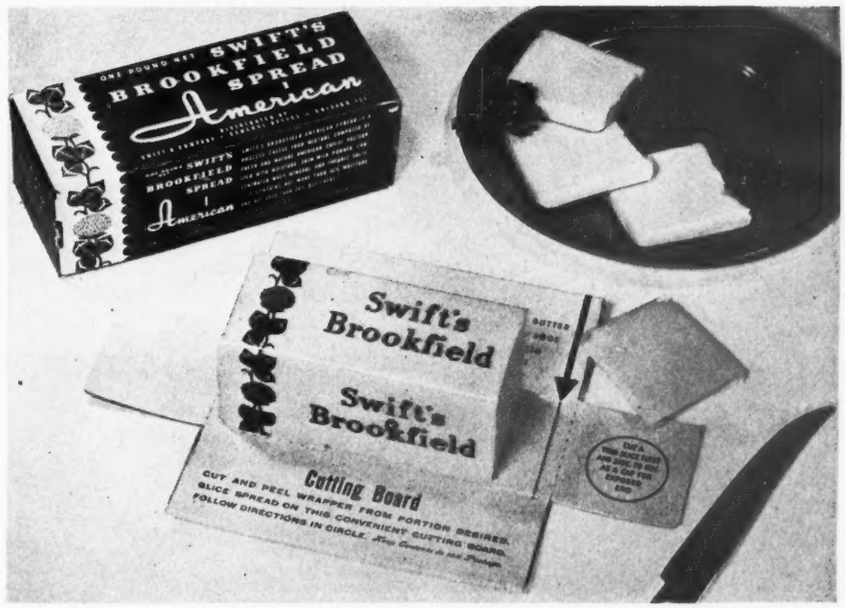
Apothecaries vs. Grocers

IN A RECENT advertising campaign. Kellogg Co. has told housewives to "Go to Grocers for Vitamins." Concurrently, grocers, IGA, Kroger and others, are offering vitamins in the grocery store, not in the foods they sell but as concentrates—pills in bottles. This is sorry indeed. Is this an admission by the grocer that the modern grocery cannot supply an adequate wholesome diet? Now at last we recognize the need for the U. S. Department of Interior's sizable expenditure for distributive education by which would-be apothecaries can be trained, if not educated, as grocers.

Men Shoppers Influence Sales

IN JUNE, July and August, 1937, FOOD INDUSTRIES discussed the distribution of grocery products through self-service stores. The "supers" were less numerous then than today. They were in a state of flux; certainly methods had not jelled. However, one of the conclusions drawn from the six-month field study made by FOOD INDUSTRIES and reported on in 1937 was that men played an important part in influencing self-service store purchases. This viewpoint is confirmed by a recent market study made by William J. Burns International Detective Agency, for *True Story Magazine,* a chart from which study is reproduced here. Either alone or accompanied by wife or another member of the family, men were present to influence half the sales made in the eleven super-markets surveyed in this study. Also, only a third of the shoppers were unaccompanied by another member of the family. The "super", as pointed out in FOOD INDUSTRIES' 1937 study, is rooted in the sociological structure of the community it serves.


Husband Accompanied by Other Person 3.2%
Other Members of Family Shopping Jointly or Alone 5.4%
Husband Alone 7.8%
Housewife Alone 22.5%
Housewife Accompanied by Son or Daughter 10.6%
Housewife Accompanied by Husband 39.1%
Housewife Accompanied by Other Person 11.4%


SWIFT'S BROOKFIELD SPREAD American
Swift's Brookfield
Swift's Brookfield
Cutting Board
CUT AND PEEL WRAPPER FROM PORTION DESIRED. SLICE SPREAD ON THIS CONVENIENT CUTTING BOARD. FOLLOW DIRECTIONS IN CIRCLE.

A Public Relations Ambassador

THE RECENTLY adopted package for "Swift's Brookfield Spread," product of Swift & Co., Chicago, is designed to function as a good-will ambassador. It offers new service and helpful suggestions to users. The carton opens so that the bottom may be used as a cutting board, protecting the edge of the housewife's knife from the hard surface of plate or metal serving table. The consistency of the cheese itself has also been made firmer so that it can be more readily sliced. Full directions for use appear on the cutting carton; also, instructions for saving the first slice to be used as a cap for the exposed end of the remaining loaf.

Byproduct is Promotion Asset

BLUE CHANNEL CORP., manufacturer of "Harris" canned Atlantic Coast crab meat, has made a promotion asset of a byproduct of the crab meat industry. Crab shells, after the meat is removed, rarely find their way to market. Blue Channel Corp. not only offers these for sale packaged to be used for serving deviled crab and other crab meat dishes, but offers them in combination with a new product, "Harris Deviled Crab," at an introductory price. The colorful empty shells are packaged eight in a transparent cellulose bag protected by a double windowed carton. Recipes enclosed in the crab shell carton suggest dishes made from Blue Channel's various canned crab meat products.

New Packages & Products

Pioneer's Favorite Packaged

In recent years there has been much evidence that the modern housewife, at least on occasions, welcomes relief from even the simplest tasks in the routine of preparing meals. Many of the recipes and dishes of grandmother's day are disappearing from the menu because of this fact. Time is precious and today's women have interesting ways to spend it.

Fried mush, a homely favorite of many American families of an earlier day, comes less and less to the table of the urban housewife. Mush preparation is simple, but time-consuming. Years ago, Jaxon Products Co., Dayton, Ohio, realizing the trend toward simplification and time conservation in the preparation of meals, prepared mush rolls for distribution to the immediate, nearby market. Offering the same mush canned and ready to slice and fry has increased the area of the reachable market and expanded sales.

Can Content Made "Visible"

Fred W. Amend Co., Danville, Ill., has recently introduced a novel container for its "Chuckles Spice Drops." The tin container for these jellied candies is lithographed to appear transparent, illustrating the varicolored sugar coated jelly candies which it contains. The container is sealed with a paperboard disk locked in against pilfering or substitution and closed with a easily opened screw top with a knurled edge on the outside to furnish a good gripping surface.

Simple Label Indicates Use

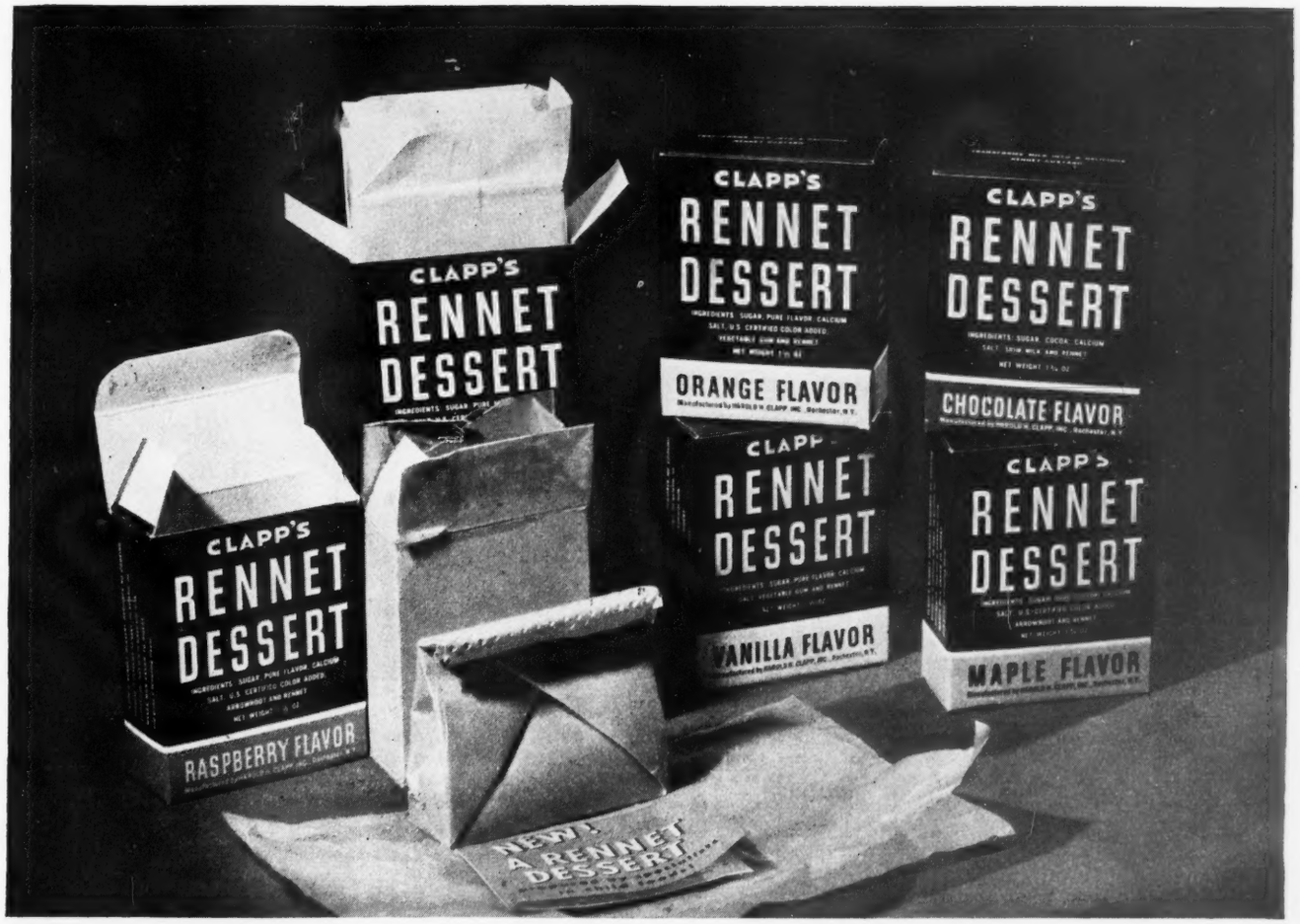
The label for "Blue Seal Salad Dressing," product of Blue Seal Food Products, Inc., Chicago, is simple. It is nevertheless colorful and impelling. Furthermore in a small area it indicates uses for the contents. On the background of the lithographed label in natural colors are fruits and vegetables used in salad making.

Five-layered Package

"Clapp's Rennet Dessert," recently introduced infant food, is protected by five layers of packaging material. The product is first inclosed in a heavy waxed paper folded to form a bag which is crimp-sealed. This is inserted into a folding carton, glue sealed. Over this carton are two layers of waxed paper, separately applied and heat sealed. The fifth layer carries the label. This outer folding carton, into which the sealed inner containers are placed, is closed but not sealed. Rennet desserts in six flavors, products of Harold H. Clapp, Inc., Rochester, N. Y., are a companion line to the baby foods manufactured by Clapp.

For Re-use in Refrigerator

The mechanical refrigerator has been responsible for many changes in



kitchen economy and methods. It has encouraged the development of new food products, revised distribution methods and influenced packaging. Mott's vinegar, product of Duffy–Mott Co., Inc., New York, is now packaged in a re-use container suitable for the storage of fruit juices or other liquids in a modern refrigerator into which it is designed to fit conveniently. The label on the container, correctly displayed when the container is placed on its side, encourages the grocer to display the package this way, thus indicating its re-use value.

White Enamel vs. Metal Luster

An innovation in canned food packaging has recently been introduced by Armour & Co., Chicago. The tin container for "Armour's Ox Tongue" does not have the typical metallic luster characteristic of most tin containers for food products. The can is enameled white. The white enamel furnishes a background which contrasts with the gold, blue and red of the labels more than would the metal luster of the typical can. The combination of labels and enamel container not only gives the package an air of quality but increases the shelf visibility of the package and adds no little to its eye appeal.

An attractive appearance, high advertising value to increase sales, low first cost, great flexibility and low operating expense were the objectives sought in this new C. D. Kenny Co. wholesale grocery delivery truck. The body is painted cream. The upper and lower circle segments are black, with the lettering in cream. The center circle band is vermilion with the word "Kenny's" in white. The "C. D. Kenny Co." and the selling line below are vermilion, as are also the chassis, wheels, cab and cowl. The hood and fenders are black. Tailgate loads are carried with good weight distribution on the chassis.

Good on All Counts — These Food Delivery Trucks

High advertising value—Low first cost —Low operating cost—Great flexibility

DEVELOPED jointly by automotive engineer and sales manager, the new standardized small delivery truck recently put into operation by the C. D. Kenny Co. combines several virtues. It is a new type of wholesale grocery vehicle of low first cost, low operating cost, great flexibility and high advertising value. The latter is obtained by a new standardized institutional lettering layout which closely links the Kenny company to the food products which it sells, thereby increasing sales.

The name of C. D. Kenny Co. (founded in 1870) has been closely associated with coffees and teas for 70 years. With headquarters in Baltimore, the company serves over 30,000 independent grocers through 43 branches, mostly in the South.

An open rear end, with curtain to protect tailgate loads, speeds route deliveries.

The Kenny branches are located principally in the states of Maryland, Virginia, West Virginia, North and South Carolina, Tennessee, Alabama, Georgia, Florida, Ohio and Indiana, with individual branches in New Orleans, Little Rock, Washington, D. C., and Buffalo. From these branches is operated a fleet of 214 motor trucks and 148 salesman's passenger cars.

Long famous for the quality of its coffees and teas in the areas served, the Kenny company, with the advent of Nathan Cummings as president in 1939, added many more items in the field of grocery specialties. The new standardized delivery truck pictured herewith has been developed to meet these changed conditions in the company's business.

In the development of the truck

painting and lettering layout to enhance the vehicle's advertising value as a means to increase sales, the first decision was to retain the two Kenny colors, cream and vermilion, as used on previous Kenny trucks. The purpose was to keep some association between old and new vehicles in the transition from the old to the new layout. But there the similarity ceased.

The retention of cream as a basic color is in keeping with the trend in painting food trucks some light color to suggest cleanliness and purity of the food products handled. Vermilion is a pleasing, rich color of good contrast.

Whereas the former Kenny trucks, except for the panorama-painted units, had their upper body panels painted cream and the lower panels vermilion, the next decision was to paint the entire body in one color—cream. This transformed the side of the body into a moving billboard of approximately double the previous height, with upper cream and lower vermilion panels. This new billboard was then ready for the Kenny sales message.

The design finally selected is as shown in the side view of the new truck shown at the top of the opposite page. It combines the well-tested bull's-eye treatment to arrest attention, in the form of a 4½ ft. circle, with contrasting colors of background and lettering within the circle.

The circle lettering is institutional in character since it covers all, but no particular, item in the company's line. It is also important that the circle include the name "Kenny's" and that the sizes of the letters of the company's products are proportional to their importance in sales volume. The full C. D. Kenny Co. name-line and secondary line below, at eye height above the ground, complete both the balance of the layout and the sales message.

The truck itself is a Chevrolet cab-over-engine model of 156⅝ in. wheelbase, selected because of its ability to carry a 12 ft. body with a 2 ft. tailgate on which bags of sugar, flour, beans, and so forth may be carried to speed route deliveries without dangerously overloading the rear tires. A side door and step are provided for curb-side deliveries. The body is of the all-metal type, using Parish-pressed steel parts, and the only wood in it is the flooring and the inside sheathing.

Rated at 1½ ton capacity, the flexibility of the vehicle has been increased by the use of a frame extension and oversize tires to carry diminishing loads up to a maximum of 5 tons.

The older painting and lettering layout as replaced by that on the new standardized Kenny wholesale delivery truck shown on the opposite page. Painting the upper panel cream and the lower panel vermilion, with a horizontal moulding in between, provided two relatively shallow panels in which the advertising matter had to be small compared with the 4½ ft. circle in the new design. The "C. D. Kenny Co." name is almost inconspicuously small inside the serrated-edged seal on the side of the body.

A panorama-painted Kenny truck body featuring two tea items in the Kenny line of coffees, teas and grocery specialties. In this particular instance, the "C. D. Kenny Co." name stands out. The inference is also clear that Kenny's "Cheon" and "Parkway" teas may be secured at the onlooker's independent grocer. But the sales appeal of the design is exclusively on the two brands of teas shown.

Another panorama-painted truck, this time featuring one of the Kenny coffee brands, "Norwood", in a vacuum-packed can. Again the emphasis is on one item in the Kenny line and not the entire line. When loads are carried on the tailgate in the position shown, the rear truck tires are grossly overloaded, a condition remedied by the positioning of the 12 ft. body on the new cab-over engine Chevrolet shown on the opposite page.

The Food Industry News

Cereal Chemists Hear 77 Technical Papers

Cereal chemists steeped themselves in the technology of the food industries at the annual convention of American Association of Cereal Chemists in New York, May 20–25. There were four days of technical sessions with no less than 77 professional papers. Three hundred and sixty-six people attended the meetings and the exposition of equipment and supplies held in conjunction with the convention.

Outstanding among the papers presented were "The Origin of the Gas Cell in Bread Dough," by John C. Baker and M. D. Mize, Wallace & Tiernan Co., Newark, N. J., and "The Structure of the Gas Cell in Bread Dough," by Mr. Baker. New light on the nature of the gas cell and, consequently, on the best procedures for mixing and kneading dough was contained in these papers. According to the first of the papers, the cells in dough originate for the following reasons: (1) The gas cells in the endosperm particles are incorporated in the dough. (2) The gas voids between the endosperm particles in the flour are occluded in the dough during mixing. (3) The mixing beats gas into the dough and subdivides it to produce gas cells of small size. (4) The gas pressure caused by the gas generation of the yeast will originate new gas cells around the yeast organism. (5) The work applied to the dough after it is mixed, such as folding, punching, rolling, molding and twisting, subdivides the gas particles to increase their number.

Need for change in bakery policy was stressed by Fred Cobb, Green Bay, Wis., who represented the American Society of Bakery Engineers. The industry, generally, has disregarded bread flavor to the detriment of the business. The trend toward perfect appearing bread is definitely unfavorable if gained at the expense of flavor, Mr. Cobb said.

Another feature of the convention was the starch symposium. Among the papers at this session were: "The Research Program on Starch in the New Regional Research Laboratories," by Henry G. Knight, U.S. Department of Agriculture, Washington; and "The Schardinger Crystalline Dextrines," by C. S. Hudson, U. S. Public Health Service, Washington. Important new studies on the characteristics of wheat starch were reported in the symposium.

New officers elected by the Association were: Claude F. Davis, Noblesville (Ind.) Milling Co., president; Charles N. Frey, Fleischmann Laboratories, New York, vice-president; and Perrie Rumwold, Standard Milling Co., Kansas City, Mo., treasurer. M. J. Blish continues as editor in chief of *Cereal Chemistry* and J. M. Doty, Omaha Grain Exchange, was reelected secretary of AACC.

CLAUDE F. DAVIS

CHARLES N. FREY

No Funds for Tea Inspection

Culminating a two-year fight in the House of Representatives to eliminate funds for enforcing the Tea Inspection Law, the conference report on the Department of Agriculture appropriation bill cut out all funds for that purpose. This means, declare officials of the F&DA, that there will be no enforcement of the law this coming fiscal year.

Help on Food Law Problems

Anyone in the ice cream industry with a question regarding the Food, Drug and Cosmetic Act may get the answer by writing International Association of Ice Cream Manufacturers, 1105 Barr Bldg., Washington, D. C. This service was announced last month by the association.

Millers Seek Better Industry Relations

Improved grain and milling industries relations and closer contact with the flour and bread consuming public were the goals of attainment set by the 38th annual meeting of the Millers National Federation in Chicago, May 9 and 10.

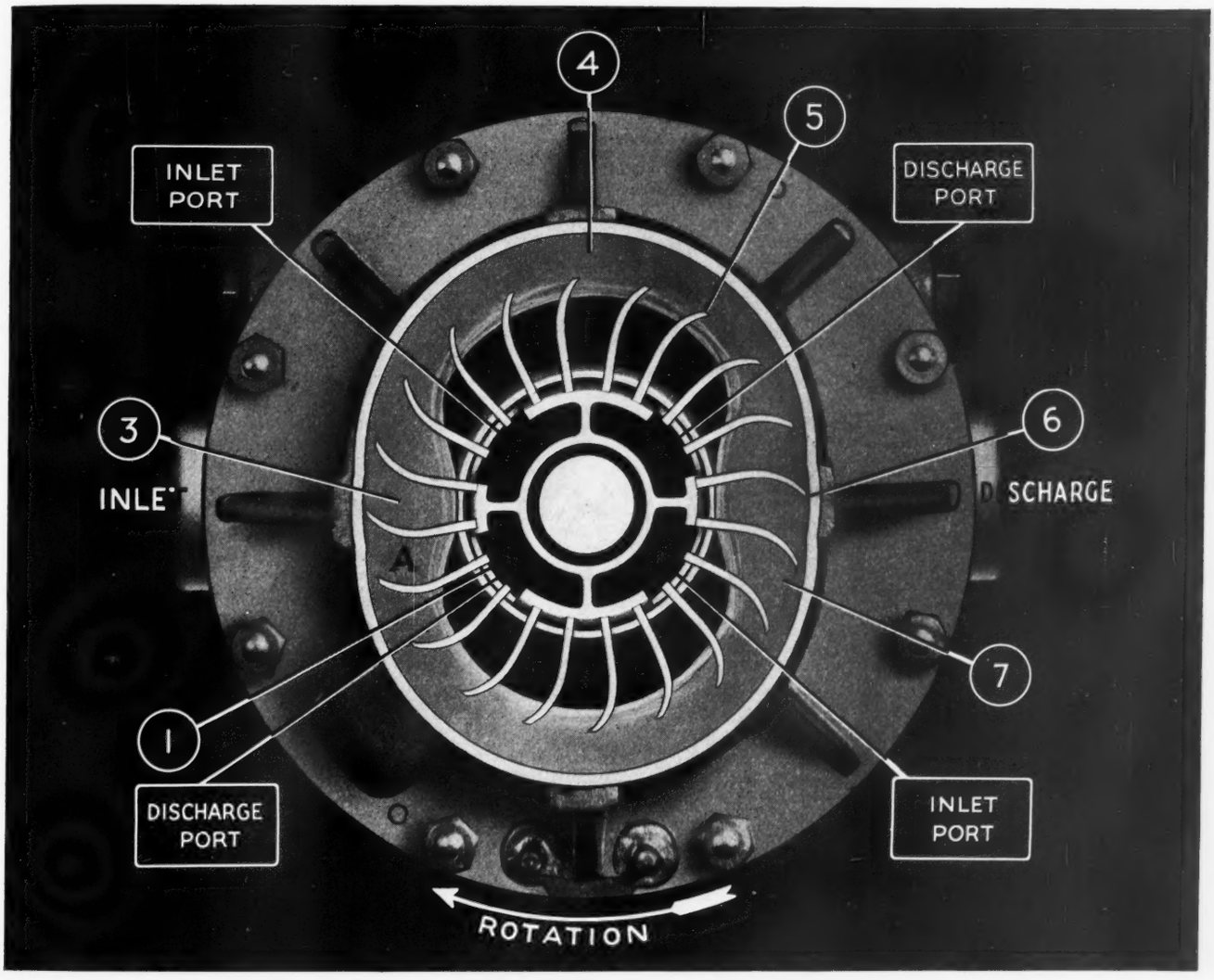
Recommendations for improved milling industry conditions included: establishment of a policy-making committee; encouragement of increased planting of wheat varieties desirable for milling; and elimination of consignment shipping, of accepting offered bids below the established market price, of packing under brokers' private labels, and of selling on split commission basis.

Mrs. Clara G. Snyder, director of food and nutrition of the Wheat Flour Institute, in reviewing the consumer movement from its start in 1908 to the present day, urged the wheat flour millers to encourage the closest relationships possible with the buyers of their products.

Summing up his discussion on "White Flour and Vitamins," C. H. Bailey, University of Minnesota, reminded the millers that "There is no present evidence of a general gross lack of vitamin B_1 in the dietary of those groups of Americans who have an adequate food budget. On the other hand, for those who do not have a wide variety of foods, a greater certainty of an adequate consumption of vitamin B_1 would result from a moderate reinforcement of cereal products, including bread, with this food accessory."

In the course of the meeting of the board of directors, presided over by president-elect, R. Ward Magill, Kansas Milling Co., Herman Steen and Herman Fakler were re-elected vice-presidents and Herman Steen was elected vice-president of Wheat Flour Institute.

Why AIR OR GAS COMPRESSED WITH A NASH IS DELIVERED FREE FROM DUST, HEAT, OR OIL



Since the Nash Compressor has but one moving part, cast in one piece, rotating without metallic contact, and requiring no internal lubrication, no oil is present.

Dust and heat are removed by the Nash "Liquid Piston". The round Nash rotor revolves in an elliptical casing containing liquid, usually water. The water, carried with the rotor, follows the contour of the casing. The water therefore recedes from the rotor at the wide part of the ellipse, and surges back, filling the blade spaces, at the narrow part. Thus liquid pistons are created in each rotor space, which compress the air, delivering it at the outlet ports indicated.

Air from a Nash Compressor is therefore delivered free from dust, heat, or oil, without supplementary filters or air washers, in a structure with no internal wearing parts.

THE NASH ENGINEERING COMPANY

SOUTH NORWALK, CONNECTICUT, U. S. A.

PROGRAM

First Annual Meeting
Institute of Food Technologists

MORRISON HOTEL, CHICAGO, ILL.
JUNE 16 to 19, 1940

Registration:
Sunday, June 16, 3 to 9 p.m. Monday, June 17, 8 to 9:30 a.m.

OPENING SESSION

Monday, June 17, 9:30 a.m. to 12:30 p.m.

Process Engineering in Food Technology—L. V. Burton, chairman.

Special comments and keynote remarks—S. C. Prescott, president of the Institute, dean of science, Massachusetts Institute of Technology, Cambridge, Mass.

Engineering a Food Manufacturing Process—L. V. Burton, editor of FOOD INDUSTRIES, New York, N. Y.

Application of the Unit Operations of Chemical Engineering to the Food Industries—W. L. Badger, manager, consulting engineering division, Dow Chemical Co., Ann Arbor, Mich.

Engineering a Continuous Evaporation and Hydrolysis Process—G. T. Reich, technologist, Pennsylvania Sugar Co., Philadelphia, Pa.

The Chemical Engineer Looks at a Food Process—N. E. Berry, director of engineering research, General Foods Corp. New York, N. Y.

SECOND SESSION

Monday, June 17, 2 to 4:30 p.m.

Voluntary Papers on Food Technology President S. C. Prescott presiding.

War-time Procurement and Industrial Mobilization—Major P. P. Logan, Quartermaster Corps, U. S. Army, Washington, D. C.

Sanitary Principles in the Design of Dairy Equipment—G. W. Putnam, Creamery Package Manufacturing Co., Chicago, Ill.

Chemical and Physical Methods for the Determination of the Quality of Peas and Corn—F. A. Lee, N. Y. State Agricultural Experiment Station, Geneva, N. Y.

Mechanisms of Heat Transfer During Thermal Processing—John Jackson, American Can Co., Maywood, Ill.

Moisture Content of Bread and Its Comparison with Other Staple Foods in the Diet—W. H. Cathcart, American Institute of Baking, Chicago, Ill.

Effect of Aluminum on the Germicidal Efficiency and Determination of Causticity of Washing Solutions for Refillable Glass Containers—C. A. Shillinglaw and M. Levine, Iowa State College, Ames, Iowa.

Vitamin B_1 Levels at Various Stages of the Malting and Brewing Process—L. Laufer, M. W. Brenner and S. Laufer, Schwarz Laboratories, New York, N. Y.

BUSINESS SESSION

Monday, June 17, 4:30 to 5:30 p.m.

THIRD SESSION

Tuesday, June 18, 9:30 a.m. to 12:30 p.m.

Smyposium: Effect of Processing on Vitamin Content of Foods—George C. Supplee, chairman.

The Nature of Vitamins with Particular Reference to the B Complex—C. A. Elvehjem, University of Wisconsin, Madison, Wis.

The Effect of Processing on the Vitamin A and Carotene Content of Foods—C. R. Fellers, Massachusetts State College, Amherst, Mass.

The Effect of Processing on the Vitamin B_1 Content of Foods—R. S. Harris and B. E. Proctor, Massachusetts Institute of Technology, Cambridge, Mass.

The Effect of Processing on the Vitamin C Content of Foods—C. G. King, University of Pittsburgh, Pittsburgh, Pa., and D. K. Tressler, N. Y. State Agricultural Experiment Station, Geneva, N. Y.

Factors Affecting the Vitamin D Content of Foods—Methods of Fortifying Milk—K. G. Weckel, University of Wisconsin, Madison, Wis.

Riboflavin Content of Dairy Products—P. Sharp and D. Hand, Cornell University, Ithaca, N. Y.

FOURTH SESSION

Tuesday, June 18, 2 to 5 p.m.
Four Division Meetings

Division A—Packaging of Foods—E. S. Stateler, chairman.

A Comparative Study of Packaging Materials for Process Cheese—Arthur B. Erekson, research director, Lakeshire-Marty Co. Division of Borden Co., Plymouth, Wis.

Some Methods of Protecting Stored Frozen Meats and Poultry—H. J. Reynolds, in charge of poultry research, Armour & Co., Chicago, Ill.

Some Observations on Materials Used in Packaging Frozen Fruits and Vegetables—Wm. Rabak, Frozen Pack Laboratory, Bureau of Agricultural Chemistry and Engineering, U. S. Department of Agriculture, Seattle, Wash.

The Control of External Corrosion of Tin Cans—Charles L. Smith and John W. Barnet, research department, Continental Can Co., Inc., Chicago, Ill.

Containers for Apple and Other Fruit Juices Pasteurized by the Flash Method—Carl S. Pederson and D. K. Tressler, N. Y. State Agricultural Experiment Station, and E. A. Beavens, Bureau of Agricultural Chemistry and Engineering, U. S. Department of Agriculture, Geneva, N. Y.

Microbiology of Fiber Containers for Liquid Foods—Evan Wheaton, research department, American Can Co., Maywood, Ill.

Studies on the Water-vapor Permeability of Paper Containers for Dry Foods—G. J. Brabender, chemical engineer, Marathon Mills Co., Rothschild, Wis.

Division B—Technology of Food Preservation — Donald K. Tressler, chairman.

The Use of Chemical Preservatives in Preserving Fish Fillets and Dressed Fish—H. L. A. Tarr, Pacific Fisheries Experimental Station, Prince Rupert, B. C.

Mold Growth on Cheddar Cheese and Its Control—F. W. Miller, du Pont Experimental Station, Wilmington, Del.

The Uptake of Zinc by Honey During Extraction From the Comb—H. A. Schuette and Paul L. Zimmerman, University of Wisconsin, Madison, Wis.

Lettuce Kraut, An Investigation of Changes Occurring in the Fermentation of Lettuce—W. V. Cruess and L. Hohl, University of California, Berkeley, Calif.

A Study of the Use of Dextrose and Sucrose in Pickling—F. W. Fabian and R. G. Switzer, Michigan State College, East Lansing, Mich.

Influence of Rate of Freezing and Storage Temperatures on the Quality of Frozen Meat—C. W. DuBois, D. K. Tressler, N. Y. State Agricultural Experiment Station, Geneva, N. Y., and F. Fenton, N. Y. State College of Home Economics, Ithaca, N. Y.

A Study of the Yellow Discoloration in Canned Oysters—E. W. Harvey and C. F. Shockey, Oregon State Agricultural College, Corvallis, Ore.

Division C—Methods of Analysis and Control of Unit Operations in Food Processing—Roy C. Newton, chairman.

Edible Fats and Oils—H. E. Robinson, Swift & Co., Chicago, Ill.

Meat and Meat Products—A. D. Rich, Armour & Co., Chicago, Ill.

Canning—G. V. Hallman, Continental Can Co., Chicago, Ill.

Cereal Products—G. Cullen Thomas, General Mills, Inc., Minneapolis, Minn.

Brewing—Louis Ehrenfeld, Pabst Brewing Co., Milwaukee, Wis.

Baking and Bakery Products—R. W. Mitchell, Purity Bakeries Corp., Chicago, Ill.

Division D—Microbiology in Food Processes—Bernard E. Proctor, chairman.

Development of Flavor in Dairy Products by Microorganisms—B. W. Hammer, Iowa State College, Ames, Iowa.

Microbiological Studies of Frozen Eggs—F. A. Nielsen and G. J. Garnatz, Kroger Food Foundation, Cincinnati, Ohio.

Microbiology of Nuts and Candies—F. M. Clark, F. W. Tanner, D. M. Snyder and B. H. Booth, University of Illinois, Urbana, Ill.

Experimental Procedure for Process Determination for Canned Foods—O. B. Williams, National Canners Association, Washington, D. C.

Bacteriological Flow Sheet Analysis of Meat and Meat Products—H. B. Richie and C. E. Jansen, Swift & Co., Chicago, Ill.

Microbiological Studies on Bacteria Isolated from Cold Storage Meat and Meat Products: (1) Identification; (2) Effect of Carbon Dioxide on Growth.—W. L. Mallman and L. Zaikowski, Michigan State College, East Lansing, Mich.

FOOD PLANTS TRIPS

Wednesday, June 19, 9:30 a.m. to 5 p.m.

LOOKS GOOD ENOUGH TO EAT

And it not only looks good but is tender. It is a cut of "Tenderay" beef at the new tenderizing plant of H. C. Bohack Co., Inc., Brooklyn, N. Y. The experts examining the beef are Thomas Donohue, meat sales manager (left foreground) and (left to right) Henry R. Streckert, superintendent of the pork department; J. L. Steiger, meat buyer; and Henry Bohlander, cooler superintendent. Using the Westinghouse Sterilamp to prevent growth of mold and bacteria, the beef is tenderized in three days at a temperature of 60 deg. F. and a relative humidity of 90 percent. The Bohack plant has a capacity of 250,000 lb. of beef a week.

Certain Food Trucks Put Under ICC Rules

A food company truck that goes to the railroad station with products to be shipped out of the state, or a truck that brings back express or freight packages that have come from outside the state, is now an interstate carrier, in effect. As such, it must meet the Motor Carrier Safety Regulations of Interstate Commerce Commission with respect to the qualifications and working hours of drivers, the methods of driving, and all safety regulations on parts, accessories, inspection and maintenance, and the reporting of accidents.

The ICC promulgated its finding on these points regarding private carrier trucks in the *Federal Register* of May 10. Food plant executives are asking their lawyers to study that set of rulings and are providing their traffic managers with the Motor Carrier Safety Regulations. (The latter can be purchased from the Government Printing Office, Washington, D. C., at 20 cents per copy, and the amendments thereto published in the *Federal Register* of May 10, at 10 cents per copy.)

The new rules will go into effect on August 1. After that the drivers must be 21 years of age and must qualify by passing a physical examination. A log of the movements of drivers must be kept available to ICC inspectors, and rules regarding the design, servicing of equipment, and accessories of trucks are prescribed.

Under the new ruling, the employees may work up to 60 hours per week despite the Wage-Hour Law. However, they must not work more than 10 hours in any 24; and other regulations are imposed.

Anti-monopoly Studies Expected in Washington

The antitrust division of the Department of Justice would like to undertake a very comprehensive inquiry into food merchandizing. Assistant Attorney General Thurman Arnold frankly confesses that it is a limited pocketbook, not a limited desire, that determines how much of this effort can be made during the next year. First on the list of candidates for investigation are the food container makers, particularly can companies.

The Department of Justice activities relate to conspiracies in restraint of trade or other multi-company problems. The Federal Trade Commission is also interested in monopolistic influences; but so far as food is concerned, it deals largely with questions of pricing and those distribution practices regulated by the Robinson-Patman Law. Several food distributors have lately been again taken to task for pricing at different rates to customers who are competitors one with the other. The establishment of Class A customers favored with a special price list is the charge against Curtice Brothers Co. in a case that lately reached the stage of a cease and desist order.

Would Put Food Stamp Plan on National Basis

Full coverage of the nation by the food stamp plan for distribution of agricultural surpluses to people on relief is recommended by Secretary Wallace. The recommendation was made by the Secretary on May 15 in a summary of the operation of the plan inaugurated a year ago in Rochester, N. Y.

While it is expected that two years will be required to extend the plan throughout the nation, the number of localities in which it is operating increases steadily. The number is now 68, but 12 additional localities have been designated to get the plan in the near future, and it is expected to be operative in 125 to 150 areas in the next few months.

Up to the first of May, expenditures for surplus foods with blue stamps amounted to $10,400,000. Of this, $2,000,000 was for butter; $1,900,000 for eggs; $1,700,000 for flour, corn meal and rice; $700,000 for vegetables; $1,700,000 for fresh and dried fruits; and $2,500,000 for pork and lard.

The Secretary estimates that 1,300,000 people are benefiting by the plan.

Answers to Food Law Questions

Interpretative Opinions from F&DA Letters to the Industry

The following material continues the monthly series of abstracts which began in the April issue of FOOD INDUSTRIES, page 75.

75. The term *"Butter Beans"* is not as widely understood as "Lima Beans"; it should be used parenthetically with the latter when desired.

76. *Arsenic, fluorine* and *lead* are not tolerated in foods in any amount when their addition is not required in the production of the food or can be avoided by good manufacturing practice; when their addition is required or cannot be avoided, the Secretary of Agriculture is authorized to promulgate tolerances.

77. *"Pork and Beans"* through long usage is a permissible labeling arrangement of ingredient names; ordinarily the ingredient which *predominates* should be named first.

78. Designation *"Mint Tea"* is apt to mislead; if a mixture of mint and tea, label should so state. Reference to source of mint used in blend should be geographically accurate if made at all.

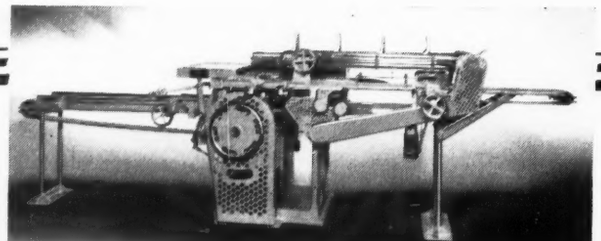
79. *Dried beans, peas* and *lentils* in *100 lb. bags* are foods in package form and must comply with label regulations.

80. Canned *fruit juices* are subject to label declaration of ingredients; use of the term "natural" is questioned when applied to a canned grapefruit juice which has

NOW!

--a proved machine for *Pliofilm* wrapping

MODEL FA



First in providing machines to handle many other types of wrapping material, the Package Machinery Company is pleased to announce that it can now supply machines for *Pliofilm** wrapping.

Moreover, it will be of special interest to manufacturers to learn that the machines used for this new material are adaptations of our popular FA models. Introduced a few years ago, the FA machines have set outstanding performance records in versatility, dependability and all-around efficiency. They are now wrapping scores of well-known products in many different industries.

In adapting the FA to *Pliofilm*, we have made important modifications which assure excellent results with the new material. Due to the exceptionally tight seal made with *Pliofilm*, the machine is equipped to apply an easy-opening device. Well past the experimental stage, the FA's fine work with *Pliofilm* has been proved by actual plant performance.

*Pliofilm T.M., Goodyear Tire & Rubber Company

If you are considering *Pliofilm* for your product, don't fail to consult us about machine wrapping. Get in touch with our nearest office.

PACKAGE MACHINERY COMPANY, SPRINGFIELD, MASS.

NEW YORK CHICAGO CLEVELAND LOS ANGELES TORONTO

Mexico, D. F: Agencia Comercial Anahuac, Apartado 2303
Buenos Aires, Argentina: David H. Orton, Maipu 231
Peterborough, England: Baker Perkins, Ltd.
Melbourne, Australia: Baker Perkins, Pty., Ltd.

PACKAGE MACHINERY COMPANY

Over a Quarter Billion Packages per day are wrapped on our Machines

been subjected to the usual heat treatment, even though nothing has been added to the juice.

81. "Fixatives" used with *pure fruit flavors* are actually artificial flavors and must be declared on the label.

82. No tolerance has been announced for the amount of *caffeine* in soft drinks, but its use is discouraged in any amounts.

83. *Diglycol stearate* is apparently a toxic substance and should not be used as an emulsifying agent in foods.

84. "Peach Blossom Honey" implies that the chief floral source of the honey is peach blossoms; this would limit the production of such honey to the normal peach blossoming season.

85. *Coffee* labels may designate as "Java," "Mocha," "East Indies," etc., only those coffees which are grown in the indicated regions. ("Mocha" applies to coffee produced in that district of Southern Arabia known as "Yemen".)

86. "Solid Pack Tomatoes" may be so labeled if the label conforms also to the provisions of the standard of identity for *canned tomatoes*.

87. A product intermediate in concentration between "Tomato Juice" and "Tomato Puree" should be labeled "Imitation Tomato Puree."

88. If a *foreign name* panel is desired on "Tomato Paste," all mandatory label information should appear on the same panel in the same foreign language; an all-English panel in addition would be required if any English representations were made.

89. *Poultry* soaked in water from from 24 to 36 hours is adulterated, because of increase in bulk or weight, or reduction in quality or strength, or misleading appearance of better or greater value than it is.

90. *Poultry* should not be termed "milk fed" unless such is the fact; an *individually* wrapped dressed bird is considered a retail package and should conform to mandatory label requirements.

91. Boxes of undrawn *poultry* in interstate shipment should show net weight of contents, common or usual name of poultry ("Chicken," not "Broiler," "Fryer," etc.), and address of *principal* place of business of original packer or final distributor.

92. "Sandwich cuts" of swiss *cheese* need not be individually labeled if sold only to distributors who do not sell these cuts intact to consumers.

93. "Home Made" may be a misleading term if the product is made in ordinary commercial factories, unless applied to a product generally understood to be no longer made in the home for commercial distribution.

94. "Eggs" may be used in ingredient listing on beverage labels if *frozen* whole eggs are used in the product, unless declaration of eggs at all is misleading because of quantity used.

95. *Gelatin dessert* packages should be redesigned to avoid *slack-filling* and consequent deception.

96. Isopropyl alcohol is not a suitable ingredient in a coal-tar color mixture for food use.

97. Ingredient declaration is not required for *noodles* or *macaroni products* which now comply with advisory standards of the Food and Drug Act of 1906, pending formulation of standards under the new act.

98. The term "Food Color Added" is inappropriate to indicate the presence of *artificial color;* labels should read "Color Added," "Artificial Color Added," or "Artificially Colored," etc.

99. Unwrapped *bakery products* require no label, but if a sticker label is used it

must comply with all label requirements; *fruits* and *nuts* used in the products must be specifically named.

100. The common or usual name of pinto beans may be held to be "pinto beans," rather than "beans"; the more informative name is suggested for labeling, used parenthetically, if desired, with the present trade-name.

101. *Flavoring compounds* containing *coal-tar colors,* if intended to color as well as flavor food to which added, require certification.

102. The use of a *neutralizer* in cream for *churning* will not be regarded as a chemical preservative; this attitude should not be regarded as approval of such practice, however.

103. *Artificially flavored* foods must specifically state such fact; label declaration of the ingredients of the artificial flavor is not alone sufficient, though it may be used in addition.

104. Addition of *artificial color* to tomato products constitutes violation of standards and adulteration.

105. *Chocolate* flavored with *vanillin* requires the declaration of artificial flavor; the term "flavored with synthetic vanillin" would be a satisfactory equivalent to the term "artificial flavor."

106. The term "vanillin" or "ethyl vanillin" is sufficient on "Imitation Vanilla Flavor" labels; in regard to *flavors* which are not "imitation," but which contain vanillin or ethyl vanillin, those ingredients must be labeled "artificial."

107. Labels should be complete on wrappers for ¼ lb. sticks of *butter,* as the unit of retail sale is frequently the ¼ lb. stick; butter score *grading* certificates are subject to labeling requirements in that they must not be false or misleading in any particular.

108. Importations of frozen *swordfish* in 50–100 lb. pieces, even though wrapped, are considered *bulk* shipments not requiring the labels of food in package form.

109. The temporary exemption from ingredient listing of lemon, orange and vanilla *extracts* is not applicable to the nonalcoholic lemon, orange and vanilla *flavors.*

SCHEDULE OF EVENTS

JUNE

3–6—National Confectioners Association of the United States, Waldorf-Astoria, New York.
3–7—Association of Operative Millers, Statler Hotel, Buffalo, New York.
9–11—American Association of Medical Milk Commissions, Hotel Roosevelt, New York.
9–11—Certified Milk Producers Association of America, Hotel Roosevelt, New York.
10—Annual Canners' Technicians School, Purdue University, W. Lafayette, Ind.
12–14—National Dairy Council, Edgewater Beach Hotel, Chicago.
13–15—Associated Grocery Manufacturers of America, The Homestead, Hot Springs, Va.
15–18—New England Bakers Association, summer convention, Poland Spring House, Poland Spring, Me.
17–19—Institute of Food Technologists, Morrison Hotel, Chicago.
17–19—Potomac States Bakers Association, Cavalier Hotel, Virginia Beach, Va.
24–25—National Macaroni Manufacturers Association, Edgewater Beach Hotel, Chicago.
24–26—Flavoring Extract Manufacturers Association of the U.S., Drake Hotel, Chicago.
24–27—American Dairy Science Association, Purdue University, W. Lafayette, Ind.

JULY

8–10—Oyster Growers and Dealers Association of North America, New Haven, Conn.
9–11—National Confectionery Salesmen's Association of America, Boston.
15–17—Annual Summer Conference of the Dairy Council, Edgewater Beach Hotel, Chicago.
24–27—Southern Wholesale Confectioners Association, Inc., Hotel Roanoke, Roanoke, Va.

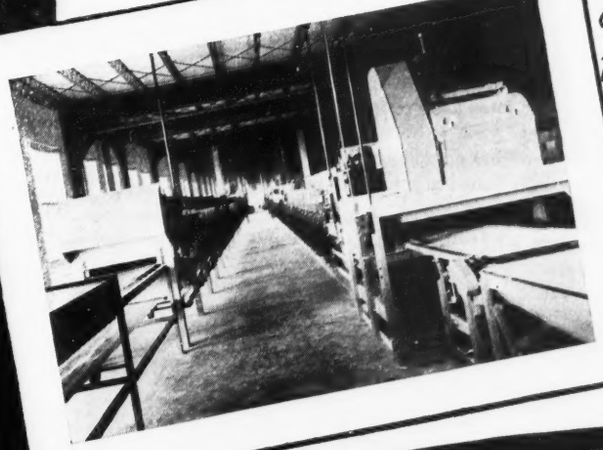
Tuesday

ar Bill—

Here's a snapshot of my new sweethearts—a couple of Greer Band Ovens, fired by the Kemp Industrial Carburator and Kemp Ribbon Flame Burners. They're 224 ft. long—each has 121 of these burners that are uniformly controlled + give even heat from side to side—and each oven puts out 2,000 to 3,000 # of baked goods an hour!

And say mister—I get more gas mileage than you do out of that new bus of yours—I'm getting a pound of baked goods for every blessed cubic foot of gas! Is that good, or is it GOOD?

Why don't you look into this Greer-Kemp combination for your new Atlanta Branch. Write the C. M. Kemp Mfg. Co., 405 E. Oliver Street, Baltimore, Md. a good bunch to know and told me a t of things saved me plenty—so



KEMP of BALTIMORE

Speed and Cooperation Mark Tomato Hearing

At a hearing in Washington on May 2, F&DA received evidence on a proposal by National Canners Association to amend the definition and standard of identity for canned tomatoes, as promulgated in the *Federal Register* of July 18, 1939. This amendment would make legal the addition of calcium chloride in sufficient quantity to give a firm structure to the product.

Remarkable among government hearings for its brevity and cooperative spirit, this session heard at length Dr. Z. I. Kertesz of the New York State Agricultural Experiment Station, who developed the technology upon which this proposed change is based. Other witnesses included T. G. Tolman, American Can Co.; Dr. C. A. Greenleaf, National Canners Association; C. P. Lathrop, Curtice Bros. Co.; W. C. Pressing, Crampton Canneries, Inc.; J. R. Phillips, Jr., Berlin, Md., and Ruth Atwater, National Canners Association. A statement was also placed in evidence by F. M. Shook, Tri-State Packers Association.

General purport of the evidence was that, when calcium chloride is added to canned tomatoes in the optimum quantity of from 7½ to 12½ grains per No. 2 can, the resulting product is firmer than when the calcium chloride is omitted. This gives the consumer a more satisfactory product without changing the wholesomeness or other qualities of the tomatoes in any way and at no increased cost.

Cross-examination by the administration's attorney and questions by the presiding officer, Michael F. Mackell, brought out the facts that calcium chloride is harmless, that its use in canned tomatoes is self-limiting because of taste, and that its use when declared on the label deceives the consumer in no way but, on the contrary, will give the consumer a better product.

After the prompt closing of the hearing, arrangements were made for findings based on the evidence, conclusions and arguments to be filed on May 13th with the hearing clerk. With this prompt handling, it was expected that a decision upon the proposed amendment could be handed down by Secretary Wallace some time around June 1. The presiding officer's suggested findings and order, published in the May 21 *Federal Register*, were favorable.

Plenty of FROST-BITE
when AND
where NEEDED
You can depend on GR-Lipman Refrigerating Machines for subnormal temperatures as low as you want to make them . . . held at a steady, uniform level. These machines supply all the "frost-bite" you want . . . accurately regulated and sustained to best suit your purpose.
No matter what your individual cooling problem may be, there is a GR-Lipman machine of the right type and size for the job. An operating record extending over a period of twenty years, in every kind of commercial refrigeration service, vouches for the efficiency, economy and dependability of GR-Lipman equipment.
If you are considering the installation of improved refrigeration to better serve your needs, by all means investigate what we have to offer. Tell us how you want to use it . . . and we will give you complete data on equipment especially suited to your requirements. Write:
GENERAL REFRIGERATION CORPORATION
Dept. FI-640, Beloit, Wis.
Dependable CONTROLLED COLD to fit your need every hour, every day.
AMMONIA • METHYL-CHLORIDE • FREON
GR AIR CONDITIONING
Lipman
AUTOMATIC REFRIGERATION

Drake Exhibits at Fair

Drake's Bakeries, Brooklyn, N. Y., is back at the New York World's Fair this year with the little bakery in the drake-topped building, contributing its part to making the food exhibits dominate the big show (FOOD INDUSTRIES, May, 1940, page 42). The exhibit is essentially the same as last year, when the exhibition plant baked 4,797,500 cookies.

Changes in Standards Made and Proposed

Early in May the latest coal-tar color docket (No. 14) was completed. Secretary Wallace promulgated regulations which simplified the title of the original docket to "Coal Tar Color Regulations." The docket also added two new colors, D&C green No. 8 and D&C red No. 39. Specifications for these new colors are given in the *Federal Register* of May 10 and become effective August 7.

Although the Food and Drug Administration will be transferred to the Federal Security Agency on June 11, for which reason dockets on flours and dietary foods were canceled last month, new dockets amending the canned cherry standards and the canned asparagus standards have been started. The amendment of the canned asparagus is to tighten up the limit on length of pieces which may be termed "points" or "tips." A hearing is to be held on June 3 with M. F. Markel as presiding officer. The proposed amendments are printed in the *Federal Register* of May 3.

Two dockets were announced for amending the canned cherries standards.

The first is to consider whether the phrase "red tart" may be used interchangeably with the term "red sour," where the latter now appears in the standards. The second docket would amend the standard by a new method of counting the pits in a can of cherries to determine whether or not it is substandard. Both dockets will be taken up at a single hearing on June 5 with M. F. Markel as presiding officer. The proposed amendments are printed in the *Federal Register* of May 7.

Organize Hop Research

Under pressure of war curtailment of hop imports, the brewers have launched a campaign of research to improve domestic hops. Brewers Hop Research Institute met in Cincinnati on April 29 to complete its organization and to outline a program for defining, classifying, standardizing and taking all steps necessary to improve domestic grown hops.

Paul Esselborn, Cincinnati, is chairman of the Institute.

Wage-hour Definitions Are Being Formulated

Two important sets of definitions are being formulated under the Wage-hour law. The earlier hearings defining "outside salesmen" for wholesalers are to be supplemented by similar proceedings of interest to manufacturers. The result is going to be, it is expected, a clear definition as to which of such workers of the food industries are exempt from the 42-hour week regulations.

Perhaps even more important for food manufactures is the set of proceedings that were scheduled to begin June 3. They will lead to definitions of "executive, administrative, and professional" employees.

The area of production hearing on the processing of fruits and vegetables, begun on May 9 (FOOD INDUSTRIES, May, 1940, page 69), lasted for three days and produced a voluminous record. The Wage-hour division is preparing its recommendations on the basis of this hearing, and hopes to have them completed by July 1.

U.S. Milk Regulations Recommended by Howe

Only through the action of the Federal government can the dairy industry be freed from the many barriers which have been set up and which prevent the free flow of dairy products from producer to consumer. That is the opinion of Dr. Frederic C. Howe, economist of the Department of Agriculture, as expressed in a report to the Temporary National Economic Committee. Dr. Howe conducted the committee's investigation of the milk industry last year.

Establishment of Federal standards and specifications for the production and distribution of dairy products is urged in the report. The adoption of Federal regulations would be accomplished by setting up an authority by law for the milk industry. This law, according to Dr. Howe, should require that all milk bought by the Federal government conform to certain specifications as to grade, price paid to the farmer and other considerations for the protection of the farmer and consumer.

Consumption of fluid milk is kept down by the high price set by the distributors, says Dr. Howe.

Cities Get Low-cost Milk

Subsidized distribution of milk to families on relief is making headway. On May 15 a low-cost milk program went into effect in New Orleans, and similar plans are operating in Boston and Chicago. Before long, New York City may adopt such a scheme.

Under this plan the milk is sold to eligible families for somewhere around 5 cents a quart. The producers accept a price of about one cent a quart less than normal, which is higher than what they would receive for milk sold for manufacturing purposes. The distributors bid competitively for the business and receive a subsidy from the Federal government, or the municipality, or both, of around 2 cents a quart, this being in addition to the 5-cent selling price. Usually the margin received by the distributors is less than their normal figure.

FTC To Watch Labels Used on Food Products

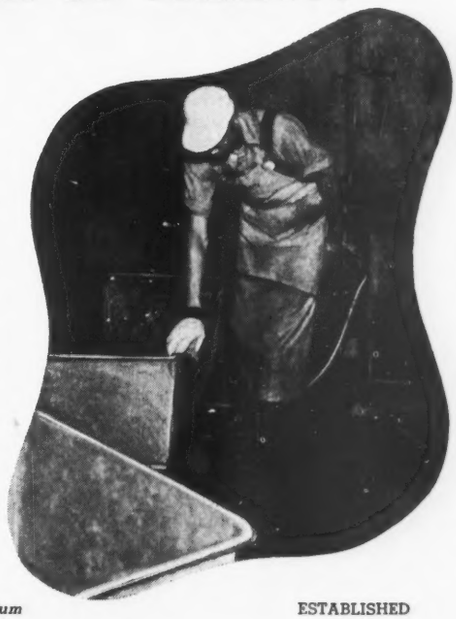
The Federal Trade Commission is planning to watch labels of food, drugs and cosmetics. This is a new asumption of jurisdiction over misleading labeling. It is based on the authority of the Commission to police any activities that amount to unfair trade competition. It is not based on any new authority given by the Food, Drug and Cosmetic Act.

The Food and Drug Administration is not protesting. It seems to feel that the more regulation there is the better. Perhaps F&DA does not expect very much action by the FTC because it is extremely difficult to prove that even a grossly misleading label amounts to an unfair method of outselling a competitor.

Such things as jams and preserves would have to be regulated by this new technic if the new standards being fixed by F&DA were not going to cover such cases of quality limits that may be deceptively described on labels. Until such standards are in force, the FTC procedure will be used, as it is now being employed against Fresh Grown Preserve Corp., New York, with the aid of National Preservers Association and its rules of fair trade practice. This company has been charged with deceptive labeling under the Federal Trade Act.

WHEN IT'S CLEAN-UP TIME . . .

Action!



LONG cleaning time earns no profit and so more food plants are standardizing on Metso, fast dissolving cleaner. It lifts grime and grease in record time. You'll very soon discover the high wetting efficiency of Metso speedily cuts through the grease, and then a special ingredient holds on, until all of it is rinsed away.

Get a sample of the quick-action, free rinsing Metso to try out on one of your dirt removal problems. It's economical in use and price.

Metso Cleaners (Sodium Metasilicate & Sodium Sesquisilicate) originated and developed by

ESTABLISHED 1831

PHILADELPHIA QUARTZ COMPANY

General Offices: 125 S. Third St., Philadelphia. Chicago Sales Office: 205 W. Wacker Dr. Stocks in 60 cities. Sold in Canada by National Silicates Ltd., Toronto.

METSO CLEANERS

METSO

CAPITAL VIEWS

F&DA TRANSFER— Those advocating transfer of the Food and Drug Administration from the Department of Agriculture to the Federal Security Agency had some weeks of worry in late April and early May when the President's reorganization plan was threatened with defeat. The House voted it down, but the Senate approved the program. Thus the President will have his way despite criticism of the transfer of the Civil Aeronautics Authority to Commerce and the abolition of the Air Safety Board. Details for the transfer of F&DA to the administration of Paul McNutt will require weeks of work. But relatively little change will occur in food dealings with the experienced personnel of F&DA, which continues with the same responsibilities as before.

FOOD STAMPS SURE— Just before the Nazis invaded Holland and Belgium, a large increase was voted by Congress in appropriations for the Department of Agriculture. Among the funds so granted after a bitter battle in the House of Representatives were moneys for a surplus disposal. This insures generous spending on the food stamp plan during the coming fiscal year. Those who favor this program are congratulating themselves that it got Congressional appropriation before the government's new defense demands were created. They fear that a little delay might have diverted these moneys into the war chest.

THEY TRIED TOO HARD— Advocates of revision of the Wage-Hour Law were defeated by their own enthusiasm. At least this is part of the logical interpretation of the House of Representatives action of early May. Even ardent advocates of the Wage-Hour Law were willing to see a few amendments passed this year. But a combination of sharp critics and defenders of the law hung so many amendments on the proposed bill that a majority of the House decided to send the whole thing back to an unfriendly committee for further investigation. So even the simple and much-needed changes are delayed until next year. In mid-May it looked as though a similar set of tactics would help defeat changes being debated for the NLRB Act.

FOOD RULINGS— Production executives are going to welcome the new form in which the Food and Drug Administration is issuing a printed resumé of notices of judgment under the Federal Food, Drug and Cosmetic Act. These abstracts of court actions will appear in separate series as formerly, dealing, respectively, with foods, drugs and devices, and cosmetics. And within each series of pamphlets there will now be a classification of the decisions. This greatly facilitates finding out which of the multitude of abstracts one must read to be sure that he keeps abreast of court findings on all commodities or types of industrial work of importance to him. F&DA deserves the thanks of busy business men for this more logical and orderly method of presentation.

DOUBLE JEOPARDY— At least one circuit court thinks that industry is subject improperly to double jeopardy if those gaining acquittal in criminal prosecutions for food and drug violations can later be subjected to civil actions also. This does not mean, as some seem to have thought, that criminal prosecutions will be abandoned. It merely makes necessary more careful drafting of charges so that those guilty may be convicted on at least some part of the charges brought against them. Then the goods will still be subject to control, and civil penalties may be imposed without creating double jeopardy.

Construction News

	Pending (thousands)	Awarded May (thousands)	Total Awarded 1940 (thousands)
Bakery	$100	$850	$1,315
Beverages	640	730	3,179
Canning and Preserving	290	.....	....
Cold Storage Plants	327	110	465
Confectionery	135	.....	475
Grain Mill Products	500	160	925
Ice Manufactured	.....	71	151
Meats and Meat Products	1,085	120	596
Milk Products	260	95	859
Miscellaneous	605	435	2,869
	$3,942	$2,571	$10,825

War Boosts Hog Prices

Great expectations of increased export of pork products, following German occupation of Denmark, sent hog prices rapidly upward during the last half of April. Early in May, however, it became evident that Great Britain would not need to replace Danish supplies, at least for some time. In fact, the purchases of Canadian pork products by the United Kingdom were even curtailed, as British warehouses were full.

Because of these facts, hog prices, which had risen from an average of about $5.15 in Chicago early in April to a high of around $6.20, fell to $5.70 by mid-May. However, it will be noticed that this drop did not cut off more than half of the increase, indicating that the price may stabilize on a level somewhat higher than that prevailing during the early spring.

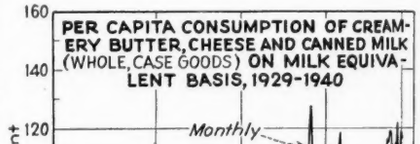
Canning Acreages Up

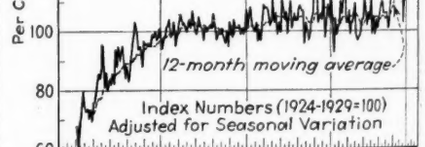
According to a recent report of the Bureau of Agricultural Economics, acreage planted to nine important canning crops this year will show an increase of 18 per cent over plantings of the same crops in 1939. The vegetables in question will include: Snap beans, increased from 53,670 acres to 57,770 acres; beets, increased from 9,060 acres to 12,430 acres; sweet corn, increased from 251,610 acres to 325,740 acres; green peas, increased from 259,450 acres to 329,230 acres; and tomatoes, increased from 371,430 acres to 380,350 acres. In contrast, spinach acreage is expected to fall from 13,860 acres harvested in 1939 to 12,400 acres planted this year.

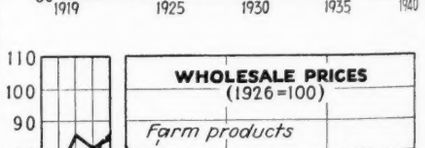
Commodities Tumble

Futures markets for most important food commodities reacted violently to the German invasion of the neutral Lowlands on May 10, dropping most of the gains built up since last September. Wheat, rye, soybeans, lard, coffee, cocoa, sugar and cottonseed oil were among the leaders in the toboggan race, with July wheat, off from $1.09 to $0.79, recording the most spectacular drop.

In contrast with these large decreases, general commodity indexes fell off more moderately. The weekly price index of the *New York Journal of Commerce* fell from 81.1 on April 20 to 79.3 on May 18. During the same period, the Irving Fisher index of







Index Number of Prices Received by Farmers—N.Y. Journal of Commerce Index of U.S. Department of Agriculture Ave. 1909-14=100) Commodity Prices (Ave. 1923-25=100)

Data for the Charts

In preparing the curves shown on this and the succeeding page of Food Industries, data were obtained from the following sources: Prices received by farmers, U. S. Department of Agriculture; employment, payrolls, wholesale and retail prices, U. S. Department of Labor; cost of living, National Industrial Conference Board; commodity price index, *N. Y. Journal of Commerce;* business activity index, *Business Week;* data for milk products consumption, U. S. Department of Agriculture.

wholesale commodity prices declined from 84.8 to 84.0.

Spot prices of food commodities followed the same general pattern during the period. Wheat, No. 2, dark winter, fell from $1.08 to $0.73¾. Flour dropped from $6.05 to $5.15 per bbl. Cocoa fell from $6.20 to $5.00. Cottonseed oil was down ½c. to 5½c. Raw sugar, duty paid, fell from $2.90 to $2.80. Lard was off from $6.95 to $5.90. Meats, however, showed little change during the four weeks period, while coffee spot prices remained steady.

Candy Use High in 1939

Per capita consumption of confectionery and competitive chocolate products in 1939 was 15.9 lb., according to the U.S. Department of Commerce. This figure was an increase of around 5.3 per cent over 1938 per capita consumption and almost equaled the per capita consumption of 16 lb. recorded in 1936. The report stated that boxed chocolates, chocolate-covered bars and confectionery packed to be dispensed in bulk by retailers were the principal items to show a gain in 1939 over 1938 figures.

INDICATORS

CONFECTIONERY and competitive chocolate products sales in March, 1940, at $19,496,000 were 1.3 per cent over sales in March, 1939, but 5.8 per cent below sales in February, 1940, according to a report of the U. S. Department of Commerce covering 234 identical firms.

SOYBEAN PRODUCTION in 1940, as indicated by planting prospects, should be around 110,000,000 bu., compared to 87,000,000 bu. in 1939.

COTTONSEED OIL USE in April, 1939, was 257,924 bbl., up 14,837 bbl. above March consumption and 53,000 bbl. above consumption in April, 1939.

CUCUMBER ACREAGE for pickles in 1940 is expected to exceed that of 1939 by 43 per cent and to be above the 1930–1938 average by 1.5 per cent.

GREEN LIMA BEAN PLANTINGS for canning and freezing in 1940 are expected to be 53,000 acres, 5.6 per cent above 1939 plantings.

APPLES CANNED in 1939 totaled 28,462,000 lb., compared to 15,612,000 lb. in 1938.

BEANS FOR DRYING in 1940 are expected to be planted on 1,935,000 acres, an increase of 11 per cent over the acreage used for this purpose in 1939.

KRAUT ACREAGE under contract this year is placed at 10,720 acres, compared to 9,575 acres planted under contract in 1939.

WINTER WHEAT PRODUCTION for 1940 was forecast on May 1 by the U. S. Department of Agriculture at 459,691,000 bu., up 33,000,000 bu. above the April 1 forecast, and comparing to 563,431,000 bu. harvested last year.

FLOUR PRODUCTION in April, 1940, as reported by *The Northwestern Miller* for mills representing 64 per cent of U. S. total flour production, was 5,202,615 bbl., compared to 5,485,519 bbl. in April, 1939.

OLEOMARGARINE SALES in March, 1940, totaled 26,593,836 lb., as indicated by sales of internal revenue stamps, compared to 27,717,854 lb. sold in March, 1939.

BUTTER, creamery, produced in March, 1940, totaled 136,625,000 lb., compared to 139,110,000 lb. in March, 1939, according to the Agricultural Marketing Service.

CHEESE, American, produced in March, 1940, was 39,585,000 lb., up 13 per cent above March, 1939, production, as reported by the Agricultural Marketing Service.

EVAPORATED AND CONDENSED MILK production in March, 1940, totaled 207,123,000 lb., up about 11 per cent above March, 1939, production.

BEER SALES in April, 1940, were up 4.8 per cent above the same month in 1939, totaling 4,176,699 bbl., according to the United States Brewers' Association.

FRUITS, frozen, in storage on May 1, 1940, totaled 75,620,000 lb., compared to 76,180,000 lb. a year before and to an average in 1935–1939 of 61,507,000 lb. for the date.

VEGETABLES, frozen, in storage May 1, 1940, amounted to 49,089,000 lb., compared to 47,425,000 lb. on May 1, 1939.

BUTTER, creamery, in storage May 1, 1940, was 9,457,000 lb. On May 1, 1939, the total was 70,909,000 lb., and the May 1 average was 21,626,000 lb. for the years 1935–1939.

CHEESE, all kinds, in storage on May 1 of this year amounted to 78,600,000 lb., compared to 75,345,000 lb. one year before and to an average in 1935–1939 of 71,393,000 lb. for the date.

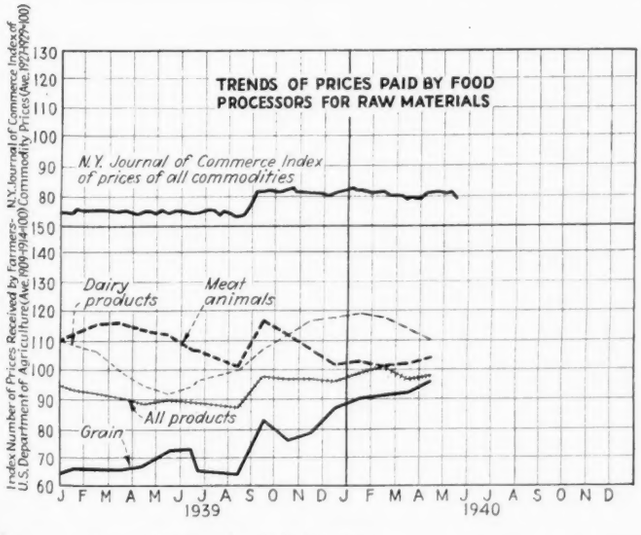
EGGS, case equivalent, in storage May 1, 1940, totaled 5,576,000 cases. The total a year previous was 5,896,000 cases and the May 1 average in 1935–1939 was 5,989,000 cases.

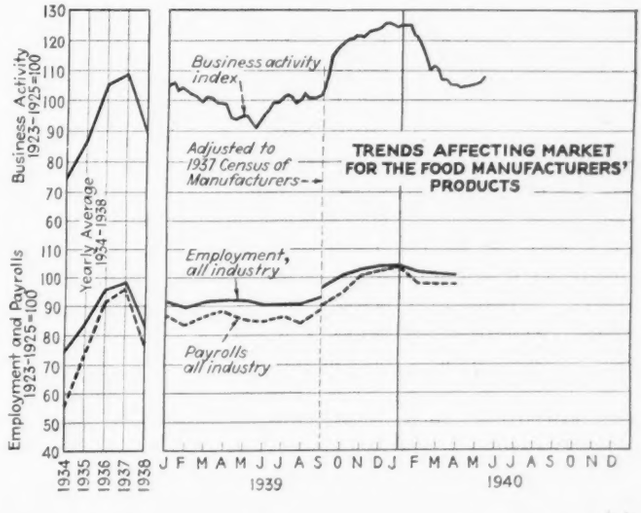
POULTRY, all kinds, in frozen storage on May 1 of this year amounted to 86,418,000 lb., compared to 70,568,000 lb. on May 1, 1939, and to an average of 67,330,000 lb. on May 1 in 1935–1939.

MEAT, all kinds, in cure and frozen storage, totaled 766,955,000 lb. on May 1, 1940. This compares to 628,744,000 lb. on May 1 last year and to an average of 700,829,000 lb. in 1935–1939 for the date.

LARD IN STORAGE May 1, 1940, totaled 266,352,000 lb., compared to 129,533,000 lb. on May 1, 1939, and to an average for May 1 in 1935–1939 of 129,141,000 lb.

WEEKLY FOOD INDEX of Dun & Bradstreet, which stood at $2.30 on April 16, registered $2.27 on May 14, the same as on the corresponding date of 1939.


TRENDS OF PRICES PAID BY FOOD PROCESSORS FOR RAW MATERIALS
N.Y. Journal of Commerce Index of prices of all commodities
Dairy products
Meat animals
All products
Grain
Index Number of Prices Received by Farmers-U.S. Department of Agriculture (Ave. 1909-1914=100)
N.Y. Journal of Commerce Index of Commodity Prices (Ave. 1923-1925=100)
J F M A M J J A S O N D J F M A M J J A S O N D
1939
1940


Business activity index
Adjusted to 1937 Census of Manufacturers
TRENDS AFFECTING MARKET FOR THE FOOD MANUFACTURERS' PRODUCTS
Employment, all industry
Payrolls all industry
Business Activity 1923-1925=100
Employment and Payrolls 1923-1925=100
Yearly Average 1934-1938
1934 1935 1936 1937 1938
J F M A M J J A S O N D J F M A M J J A S O N D
1939
1940

Men, Jobs & Companies

INDUSTRY

Borden Co., New York, is constructing an evaporated milk plant at Chester, S. C., to cost about $35,000 with equipment. The building will be so constructed as to allow for a future expansion into a $200,000 plant, dependent upon an adequate milk supply.

Borden's Milk & Ice Cream Co., Kansas City, Mo., is constructing a new ice cream plant on property which now contains a modern milk plant (recently erected), a company garage and an office building which was modernized a year ago. The main floor of the ice cream plant will be paved with brick treated to resist lactic acid. There will be a 10-in. cork insulation on all walls, floor and ceiling of the two hardening rooms, in which temperatures under 20 deg. below zero will be maintained.

Dry-Pack Corp., New York, has constructed a plant at Sodus, N. Y., for the dehydration of fruits and vegetables. If conditions warrant, the company expects to start branch plants in Texas and Washington during the coming year.

Golden State Co., Ltd., has introduced the 2-qt. milk bottle into the San Francisco market. The company first tried the new container in Los Angeles where subsequently it was adopted by all major dairy companies, including Adohr, Knudsen Creamery and Arden Dairy. Golden State has also gone in for the distribution of Birds Eye Frosted Foods in all important California markets.

PHILIP W. PILLSBURY

Philip W. Pillsbury, grandson of one of the founders, has succeeded to the presidency of Pillsbury Flour Mills Co., Minneapolis. He replaces Clark Hempstead, who was named general counsel and elected co-chairman with John S. Pillsbury. The new president, who was treasurer, is the son of the late Charles S. Pillsbury.

DANIEL W. CREEDEN

Libby, McNeill & Libby, Chicago, has elected him president to succeed Edward G. McDougall, who has become chairman of the board. Mr. Creeden was made a vice-president of Swift & Co. in 1934 and in 1938 he became a vice-president of Libby.

WILLIAM H. MATHEE

He has been appointed general manager of Horlick's Malted Milk Corp., Racine, Wis., succeeding Chase W. Love. Mr. Mathee was products director of Johnson & Johnson from 1926 to 1935. In 1936 he joined Scott & Bowne, Bloomfield, N. J., becoming president in 1938.

Hoard's Creameries, Inc., Fort Atkinson, Wis., has purchased the Whitewater, Wis., condensary of Libby, McNeill & Libby.

Kroger Grocery & Baking Co., Cincinnati, has acquired a 107½ acre farm south of Kenton, Ohio, where it will operate a modern vegetable canning plant.

Mars, Inc., Chicago, is building a 20,000 sq.ft. addition to its Oak Park, Ill., plant.

Ocala (Fla.) Coca-Cola Bottling Works has opened a new two-story plant which has double the bottling capacity of the old one. The new building is of a modernized Mediterranean architecture with colored tile outside, carved travertine, wrought ironwork, double wrought iron gates leading to an L-shaped courtyard, and a tower suggestive of those of the Mediterranean countries.

Ohio Grape Juice Association, recently organized at Geneva, Ohio, is planning to spend $100,000 for construction of a cooperatively owned and operated grape juice processing plant. There are about 14,000 tons of grapes available in this area each fall.

Pepsi-Cola Co., Long Island City, New York, has won a unanimous decision in the Court of Appeals in Jamaica, British West Indies, by which the opposition of the Coca-Cola Co. was dismissed and the registration of the Pepsi-Cola trademark was upheld. The court is the highest tribunal in Jamaica.

Red Rock Fisheries, Inc., San Francisco, will build a $100,000 sardine cannery at Point San Pablo.

S. & W. Fine Foods, Inc., San Francisco, will construct a one- and two-story, food products manufacturing plant, 150x826 ft., at Redwood City, Calif.

Sprague Warner & Co., which recently sold its large Chicago plant building to Montgomery Ward & Co., is planning to build a $1,500,000 one-story plant for food processing, warehousing and distributing. Large, below-zero storage facilities will be provided. An important part of the company's business is its quick-frozen fruits, vegetables, meats and poultry.

Sprattler & Mennel Brewery, established in Paterson, N. J., about 1870 is being remodeled by a group of Czecho-

Every letter tells the Same Story

Modern Canners prefer Lubriplate Lubricants on their Machinery!

"A clean lubricant," writes Wm. A. Free of the Hungerford Packing Co. "Even when used in contact with boiling water and steam, Lubriplate gives good service and stays clean."

"Lubriplate is practically waterproof," is the comment of R. E. Winebrenner of the D. E. Winebrenner Co. at Hanover, Pa. "We are pleased to advise that we consider this a splendid lubricant."

"The best grease we have ever used," writes George L. Smith, canner, of New Park, Pa. "Our repeated orders for Lubriplate verify this statement."

Because it's waterproof—because it's clean—because it resists corrosion . . . these are the reasons that Lubriplate is being adopted by canners all over the country. And quite naturally—for canning machinery is exposed to the destructive properties of fruit and vegetable juices. Steam and water are too often present.

Your machinery is protected from rust and corrosion when you use Lubriplate. And because Lubriplate is white, cleanliness in your plant becomes an easy matter. What's more—Lubriplate outlasts other lubricants many times, thus saving you money in actual lubrication costs, and lengthening the life of your machinery as well. Call your nearest Lubriplate distributor. Let him tell you what grades of Lubriplate to use.

DEALERS FROM COAST TO COAST

ASHEVILLE, N. C.
Tidewater Supply Company, Inc.
ATLANTA, GA.
Chears Company
BALTIMORE, MD.
L. A. Benson Co., Inc.
BATH, ME.
Chase, Parker & Co., Ernest Wood (Representative)
BINGHAMTON, N. Y.
Ellis W. Morse Co.
BIRMINGHAM, ALA.
Jefferson Brick Supply Co.
BOSTON, MASS.
Chase, Parker & Co.
BUFFALO, N. Y.
J. R. Sullivan (Representative)
BUTTE, MONT.
Montana Hardware Co.
CHATTANOOGA, TENN.
Noland Company
CHICAGO, ILL.
Metal Lubricants Co.
CINCINNATI, O.
Cincinnati-Vulcan Co.
CLEVELAND, O.
J. R. McKee (Representative)
COLUMBIA, S. C.
Tidewater Supply Company, Inc.
DALLAS, TEXAS
The Wink Supply Company
DENVER, COLO.
M. L. Foss, Inc.
DES MOINES, IA.
Iowa Mach. & Supply Co.
DETROIT, MICH.
Fiske Bros. Refining Co.
EL PASO, TEXAS
Smith Machine Co.
GREAT FALLS, MONT.
Montana Hardware Co.
HELENA, ARK.
Lewis Supply Co.
HOLYOKE, MASS.
J. Russell & Co.
HONOLULU, T. H.
Hawaiian Sales Factors, Ltd.
Von Hamm-Young Co. Ltd.
HOUSTON, TEXAS
The Rex Supply Co., Inc.
HUNTINGTON, W. VA.
Banks-Miller Supply Co.
KANSAS CITY, MO.
The Victor L. Phillips Co.
KNOXVILLE, TENN.
Knoxville Belting & Supp. Co.
LOS ANGELES, CAL.
L. A. Rubber & Asbestos Co.
MEMPHIS, TENN.
Lewis Supply Co.
MILWAUKEE, WISC.
Filmite Oil Corporation
MINNEAPOLIS, MINN.
McGlynn Oil Co.
MOBILE, ALA.
Turner Supply Co.
MUSKEGON, MICH.
Lakeshore Mach. & Supply Co.
NEWARK, N. J.
Seither & Ellis, Inc.
NEW ORLEANS, LA.
C. T. Patterson Co.
NEW YORK, N. Y.
Topping Brothers, Inc.
NORFOLK, VA.
Tidewater Supply Company, Inc.
OKLAHOMA CITY, OKLA.
The Victor L. Phillips Co.
OMAHA, NEB.
John Day Rubber & Supp. Co.
PASSAIC, N. J.
N. J. Engineering & Supp. Co.
PEORIA, ILL.
Parker Sales Co.
PHILADELPHIA, PA.
Tristate Corporation
PITTSBURGH, PA.
R. G. Schenck (Representative)
PORTLAND, ME.
Chase, Parker & Co., V. W. Everett (Representative)
PORTLAND, ORE.
Goodyear Rubber & Asb. Co.
PROVIDENCE, R. I.
Farr & Read Company, Inc.
ROANOKE, VA.
Tidewater Supply Company, Inc.
ROCHESTER, N. Y.
Sidney B. Roby Co.
SALT LAKE CITY, UTAH
Industrial Supply Co.
SAN DIEGO, CAL.
Hudson-Tucker, Inc.
SAN FRANCISCO, CAL.
Miller & Stern Supply Co.
SAVANNAH, GA.
John D. Robinson Co.
ST. LOUIS, MO.
Industrial Lubricating Co.
SEATTLE, WASH.
Chas. H. Harden & Co.
SPOKANE, WASH.
Nott-Atwater Co.
SYRACUSE, N. Y.
Belt-Rope Supply Co.
TOLEDO, O.
Fiske Brothers Refining Co.
Kirkby Mach. & Supply Co.
TRENTON, N. J.
Standard Supply & Equip. Co.
TROY, N. Y.
Fred K. Blanchard, Inc.
UTICA, N. Y.
Central N. Y. Sales Co.
WETHERSFIELD, CONN.
T. E. Morris (Representative)
WILLIAMSPORT, PA.
L. L. Rauch (Representative)
WILMINGTON, DEL.
W. Floyd Jackson Co.
WINTER HAVEN, FLA.
V. G. Modena
WICHITA, KAN.
The Victor L. Phillips Co.
YORK, PA.
Geo. F. Motter's Sons Supp. Co.

CANADIAN DISTRIBUTORS

MONTREAL, QUE.
Williams & Wilson, Ltd.
QUEBEC, P. Q.
Williams & Wilson, Ltd.
TORONTO, ONT.
Williams & Wilson, Ltd.
VANCOUVER, B. C.
Fleck Bros., Ltd.

ESTABLISHED 1870 — 70th ANNIVERSARY — FISKE LUBRICANTS

ISKE BROTHERS REFINING CO., Newark, N. J. • Toledo, Ohio

slovakians who plan to brew beer and produce other beverages to replace imports cut off by the war. The old plant name will be retained. There are 12 buildings to the plant, which occupies 32,000 sq. ft.

G. S. Suppiger Co., St. Louis, Mo., has purchased outright the Converse (Ind.) Packing Corp.'s buildings, equipment and all merchandise on hand.

PERSONNEL

J. A. Amundson heads the newly organized Lange Canning Corp., Eau Claire, Wis., which has acquired the plant and all equipment formerly owned by Lange Canning Co. Mr. Amundson was general manager of the old firm.

Daniel F. Bull has been elected president of Cream of Wheat Corp., Minneapolis, to succeed George B. Clifford, Sr., who has become chairman of the board. Mr. Bull has been vice-president and general manager.

W. L. DeWeese has been named manager of the Toledo, Ohio, branch of H. J. Heinz Co., Pittsburgh. He succeeds M. G. Thomas, who has become manager of the Albany, N. Y., branch.

Schuyler Hibbard has been appointed manager of the Rushville, N. Y., plant of Comstock Canning Corp., Newark, N. Y., succeeding John Wirth.

P. C. Hyson has been elected president and general manager of Omaha (Neb.) Cold Storage Co., to succeed the late L. B. Kilbourne. H. C. Sheridan, sales manager, was made vice-president.

J. D. Kerr has been advanced from vice-president to president of American Fruit Growers, Inc., Los Angeles, replacing W. H. Baggs, resigned. W. M. Scott, regional director for the company in the Southeast, was named vice-president.

J. U. Lemmon has been made a vice-president of Doughnut Corp. of America, with headquarters at Boston.

Thomas H. McInnerney, president of National Dairy Products Corp., New York, has been elected vice-president of the northeastern division of the United States Chamber of Commerce.

George L. Morrison has been elected president of General Baking Co., New York, to succeed C. Leslie Lowes, who has resigned as president and a director of the concern. Mr. Morrison is president of General Cold Storage Co., Philadelphia.

Philip Palmer has been named manager of the Owosso, Mich., canning plant of W. R. Roach & Co., Inc., Grand Rapids, to succeed the late R. O. Seeley.

Karl M. Sayles has advanced from vice-president to president and general manager of Deerfoot Farms Co., Southboro, Mass.

Walter L. Schroder has been elected president of the newly organized Associated Soy Bean Canners of America, formed for the purpose of promoting canned green soy beans. Mr. Schroder is president of Fox Valley Canning Co., Hortonville, Wis.

Dr. Henry A. Schuette, professor of chemistry at the University of Wisconsin, Madison, has been elected president of American Oil Chemists' Society.

Hugh P. Wasson, of Chattanooga, Tenn., heads the Southern Bakers' Association for 1940.

R. A. Welsh, Jr., has become president of Bellingham Canning Co., Seattle.

J. M. HOVEN

California Preserving Co., Los Angeles, has promoted him from secretary-treasurer to president of the company.

DR. J. A. DUNN

Dr. J. A. Dunn has been appointed director of technical service of Diamond Crystal Salt Co., Inc., St. Clair, Mich.

for Greater Productive Capacity

CUTTING
FLOCKING
CRUSHING
GRINDING
PULVERIZING
SIFTING
SORTING
CLEANING
ELEVATING
CONVEYING
ETC. ETC. ETC.

Like "Champion Betsy of Cloverdale," Robinson processing equipment has earned its fine reputation by *producing*—by turning out more finished material in a shorter time for less money . . . For any of the operations shown at *left* we are well qualified by 40 years experience to assist you in selecting exactly the right machine for the job in question—a machine of *greater productive capacity* per hour and per horse-power. Write us today.

ROBINSON MANUFACTURING CO.
71 Painter St., MUNCY, PA.

DEATHS

Prof. Lewis B. Allyn, 65, research chemist, May 7. He was slain by an unknown assailant at his home in Westfield, Mass. Federal authorities are investigating a report that he had refused to disclose a secret formula for a new concentrated food to an agent for a "European power" 24 hours before his death.

Larimer Alanson Cushman, 65, a founder and former president of Cushman's Sons, Inc., New York, May 13, at Mockon Island, Townsend, Va.

Paul Esselborn, 66, president of Clyffside Brewing Co., Cincinnati, May 12. He was a director of the American Brewing Industry and a member of the Hops Control Board.

C. W. Foster, president of Des Moines Cooperative Dairy and a member of the board of directors of the National Dairy Council, April 25.

O. L. Gregory, 76, president of Gregory-Robinson-Speas, Inc., Paris, Tex., May 11.

Charles L. Gripp, 72, founder of Seven-Up Co., St. Louis, April 16.

Isaac N. Hershey, 67, formerly president and one of the founders of Hershey Creamery Co., Harrisburg, Pa., April 15, at Elizabethtown, Pa.

Col. Gustave Porjes, 77, president of Strohmeyer & Arpe Co., New York, May 12. He was chosen by Gen. John J. Pershing to help supervise the purchase of all food supplies for the A.E.F. in France during the first World War.

ASSOCIATED INDUSTRIES

Allegheny Ludlum Steel Corp., Pittsburgh, has appointed C. B. Boyne as manager of stainless sales.

Fruehauf Trailer Co., Detroit, has made A. L. Struble general sales manager.

General Electric Co., Schenectady, N. Y., has named Chester H. Lang manager of apparatus sales.

International Harvester Co., Chicago, has elected J. L. McCaffrey vice-president in charge of sales to succeed Charles R. Morrison, retired.

Technical Laboratories, an organization devoted to the scientific control of food manufacture, has opened new and enlarged laboratories in New York, N. Y.

Wilson & Bennett Manufacturing Co., a subsidiary of Inland Steel Co., has elected H. Denbigh Ellis president to succeed Wilfred Sykes. Mr. Sykes remains chairman of the board.

REMOTE TEMPERATURE READINGS AT EYE LEVEL

MOTOCO Model F 1 Thermometer $20 List Price

MOTOCO Indicating Thermometers have rigid stem for direct mounting or capillary tubing for remote reading.

IMPROVE *and* SAFEGUARD

MEATS • FISH • POULTRY • FROZEN FOODS • SOUPS • BUTTER • CHEESE • CONFECTIONERY • BEVERAGES • BAKERY PRODUCTS

In food processing, it pays to have exact knowledge about temperatures. Important, money-saving temperature facts are instantly, conveniently available when you have MOTOCO temperature indication in your plant.

To reduce processing costs and insure uniform quality, mount MOTOCO Indicating Thermometers on guard at every point where temperature is a factor.

MOTOCO Industrial Thermometers are made with numerous standard scale ranges for individual requirements . . . combine absolute accuracy with strong, simple construction. No racks, gears, pinions or delicate hair springs to get out of order or require frequent adjusting.

Write today for MOTOCO Folder, which gives information on sizes and prices: Moto Meter Gauge & Equipment Div., The Electric Auto-Lite Company, Chrysler Building, New York, N. Y.

. . . motoco . . .

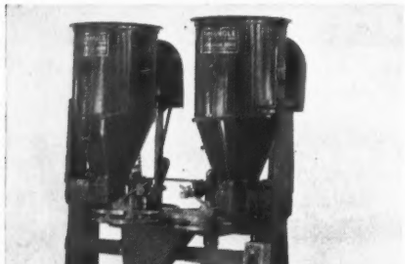
INDUSTRIAL THERMOMETERS

Food Equipment News

REVIEW OF FOOD PROCESSING EQUIPMENT, ACCESSORIES, AND SUPPLIES

Twin Volumetric Filler

TRIANGLE PACKAGE MACHINERY CO., 918 N. Spaulding Ave., Chicago, Ill. has developed a machine designed to fill two separate ingredients of different characteristics and volume into one container. This machine is in



Filling machine for handling two different ingredients into the same package.

reality a combination of two Triangle volumetric fillers, both driven by one motor. The two machines are synchronized so that discharges from each filler are simultaneous. Each unit has an agitator in the hopper, with four-cup measuring plate and a common discharge mouth. The amount of the discharge of each unit can be varied by simple adjustments and the adjustments on the two units are independent.

Handling of two different products of different specific gravity or of items having a tendency to separate from each other, was the object in designing this package filling machine. For instance, its use is recommended in handling such a product as noodle soup mix where seasoning powder and dehydrated vegetables are packaged in the same envelope to be placed in a carton with the noodles.

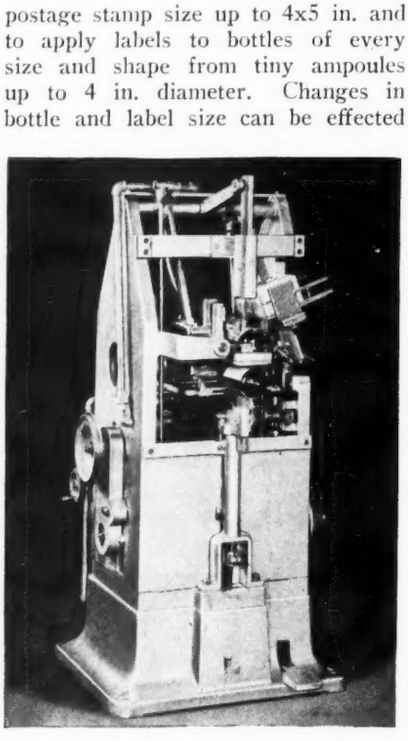
Immersion Heaters

WESTINGHOUSE ELECTRIC & MFG. CO., Mansfield, Ohio, is making two improved types of immersion heaters, designed specifically for heating mineral oils, paraffin and alkaline cleaning solutions. One of these is designed for use with tanks or other equipment where little or no circulation is required. In it, the heating tubes range from 14 to 37 in. in length with a rating of from 1 to 3 kw. These heaters are designed for use with heavy liquids which cannot be circulated at low temperatures or which absorb heat slowly and which require a low watt density rating.

The other heater is a circulating type for application where a liquid can be circulated at a sufficient rate to absorb heat and prevent excess heater tube temperatures. This latter type has tubes ranging from 32½ to 37 in. in length with ratings from 5 to 8 kw. This type of heater is suitable for use with trisodium phosphate and alkaline cleaning solutions.

Semi-automatic Labeling Machine

WIDE RANGE is claimed for the new Model CH semi-automatic labeling machine brought out by Economic Machinery Co., Worcester, Mass. This device is said to handle labels from postage stamp size up to 4x5 in. and to apply labels to bottles of every size and shape from tiny ampoules up to 4 in. diameter. Changes in bottle and label size can be effected by the removal of a single bolt. The adhesive applicator is designed to spread the adhesive over the entire surface of every label and it is claimed that smooth, precise and tight labeling is obtained. Capacities range from 20 to 60 containers per minute and the floor space required by the machine is 2½x3 ft.



Semi-automatic labeler.

Processing Unit

DESIGNED to combine two or more operations in one machine, Abbe Engineering Co., 50 Church St., New York, N. Y., has developed a new type of Abbe-Lenart processing unit. This unit is a cylindrical container of steel, stainless steel or other metal

Unit in which disintegrating, mixing, agitating and other operations can be carried out.

embodying the patented Abbe-Lenart agitating and dispersing mechanism consisting of a ribbed mixing disk, a stator ring and a stationary, baffled, slotted inner cylinder. Rotation of the disk forces the material through the narrow aperture between it and the stator ring, causing rapid milling, disintegration and dispersion of the material to a finely divided and homogeneous state. The material is then impelled upward by the spiral circulating action through the entire charge and is reabsorbed into the vortex of the inner cylinder through its slots and over its top. Repeated circuits of this nature cause a mixing or dispersion of great intensity which is

Patapar?

NEVER HEARD OF IT!

What? Never heard of it? Why right now you're probably depending on it at home. It's likely to be bringing butter, cheese, meat or fresh vegetables to your kitchen in an inconspicuous but effective way. It looks like paper—BUT Patapar *doesn't go to pieces in boiling water!* It resists grease! It is made for adverse conditions! At the same time it has a beautiful surface for the printing of labels in color.

Does the fact that you are probably depending on Patapar at home suggest that you might also depend on it in your business? Scientific and medical laboratories are using it in countless ways. Canners, shippers, florists—a great variety of users find that the unique characteristics of Patapar are just what they are looking for!

If you have a hunch that Patapar could be helpful to you, write us on your company letterhead. Tell us the use you have in mind and we'll send samples and full information.

Patapar
Reg. U. S. Pat. Off. & Foreign Countries

Vegetable Parchment

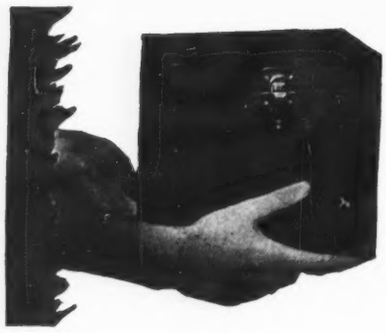
PATERSON PARCHMENT PAPER COMPANY

Bristol, Pennsylvania

West Coast Plant: 340 Bryant Street, San Francisco, California

Branch Offices: 120 Broadway, New York, N. Y. . 111 West Washington Street, Chicago, Ill.

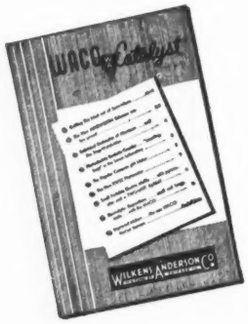
HEADQUARTERS FOR GENUINE VEGETABLE PARCHMENT SINCE 1885



Glass Electrode Tester ...for the plant!

The pH Tester you asked us to build, for simple quick operation in the plant!

$87.50 Moderately Priced Full pH Range



KWSZ Photometer

Stable and as positive as your analytical balance, the Purdue KWSZ Photometer is a chemist's instrument . . . accurate to 0.1%. "Putting the KWSZ to work", in WACO FIELD NOTES, gives the busy analyst pages of abstracts of recently published methods employing the photo-cell.

BOOTH No. 16
Institute of Food Technologists
June 16th to 19th, 1940

. . . Or ask for New pH Tester Bulletin F18 with WACO Field Notes!

WILKENS-ANDERSON CO.
Laboratory Supplies and Chemicals
Chicago U.S.A.

said to save considerable time in processing.

This machine is devised for use in processing mixtures, pastes, viscous materials and other such products. It is also suitable for agitating liquids in vacuum drying or impregnation tanks. Where it is desired to use the container as a vacuum cooking kettle or where processing is desired not involving all of the mechanism, parts can be quickly taken out and as quickly put back. Units of this machine are available in sizes up to 330 gal. capacity for commercial work, while laboratory units of 1½ to 5 gal. capacity are made.

Cleaner for Compressed Air

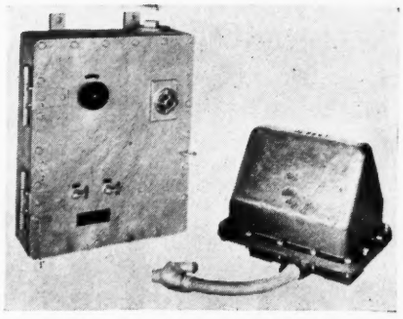
LOGAN ENGINEERING Co., 4912 Lawrence Ave., Chicago, Ill., has developed a complete line of "Aridifiers" for removing moisture and oil from air and gas lines, in all sizes from ⅜ in. to 10 in. This device removes dirt,

Device for cleaning compressed air and other gases.

scale, oil and moisture from compressed air lines and other gas lines by causing the foreign matter to impinge on a multiplicity of blades revolving in opposite directions and propelled by the flow of air or gas. It is recommended by the maker particularly for application in compressed air lines ahead of air-operated equipment or where used for processing work.

Explosion-Proof Vibrator

A VIBRATOR for use in maintaining free flow from bins, hoppers and chutes in plants where the product is explosive, such as in flour mills, has been developed by Syntron Co.,



Explosion-proof vibrator and controller for maintaining free flow from bins, hoppers and chutes.

Homer City, Pa. This explosion-proof vibrator consists of a heavy, pulsating electromagnet and is fully inclosed in a steel case with ground joints and an armored cable lead. The control panel is remote from the vibrator and contains a rectifier, operating switches and a rheostat for controlling the vibrator's power. The controller is also fully encased with ground joints and approved explosion-proof fittings.

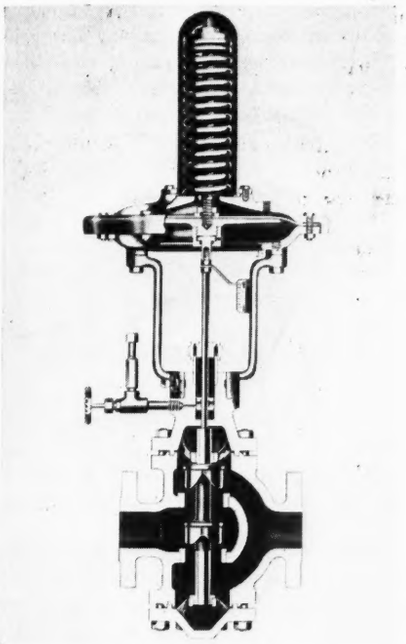
Transport Refrigeration Unit

IN SIZES to contain 50, 100, 200 and and 300 lb. of dry ice, Transport Refrigeration Co., 474 Hollister Bldg., Lansing, Mich., is manufacturing a refrigeration unit for use in the transportation of perishable foods in trucks. This is a thermostatically controlled unit made of sheet metal and so arranged as to circulate gas through a series of ducts with recirculation as desired. The theory of operation is that the cold CO_2 gas, being heavier than air, falls and as it becomes heated in extracting heat from the produce, it rises. It is stated that with this device, the gas will circulate from 12 to 20 times after which it is piped into the insulation of the truck body, serving to reduce the amount of refrigeration required.

Refrigeration unit for truck transportation.

Control Valve

AN IMPROVED LINE of "Stabilflo" controlled valves for active response to the demands of a control instrument is announced by The Foxboro Co., Foxboro, Mass. These valves are equipped with a wide range V-port plunger and have a rangeability of 50 to 1. When this valve is lifted off the seat, the initial clearance flow is 2 per cent. From this 2 per cent flow to 100 per cent flow the valve gives equal percentage increases for equal amounts



Control valve.

of valve lifts. The V-port plunger is screwed and pinned to the valve stem and is designed for easy field reversal. In addition to this V-port valve plunger, a parabolic plug type and a wide radio turned plug type are also available for control applications where desired.

Body and plunger of this new valve are designed for high lifts, said to be absolutely necessary in order to produce a valve with wide range flow characteristics as needed by automatic controllers. This construction also affords twice the movement for the same air pressure as in previous valves and it is claimed that the accuracy of positioning is twice as great. The valve is said also to have been designed with sufficient excess power to enable it to meet all operating conditions.

White Waterproof Paint

DEBARD & MORENCY MILL CO., 101 N. Lombard Ave., Oak Park, Ill., has developed "Porce-Tite," a white, waterproof, fireproof paint for exterior or interior use on cement, con-

PEST CONTROL?

"We're getting better results and our costs are lower, too."

..."Wish we had put an I.F.E. on the job sooner."

HAVE you checked up on *your* insect control problems recently? If not, it may pay you well to let an Industrial Fumigation Engineer do this job for you.

Many managers of foodstuffs manufacturing plants have found that by turning the entire job of insect and rodent control over to one of these experienced Industrial Fumigation Engineers, *their costs have been reduced* and their *results are considerably better.*

The reasons are not hard to find —an Industrial Fumigation Engineer is an expert in his line. He knows insects, their habits, life cycle, and how to control them at all stages. His experience includes fumigation under all kinds of conditions, with all types of fumigants. He is prepared to take over the entire responsibility for pest control in any plant. His own operators are thoroughly trained for their jobs. He carries Fumigation Liability Insurance for your protection. He will supply the equipment and materials that are required for every condition.

Cost? Let the Industrial Fumigation Engineer give you an estimate. Write us and we will be glad to put you in touch with the one nearest you or to send you any additional information you wish about this new service.

THE FUMIGANT?

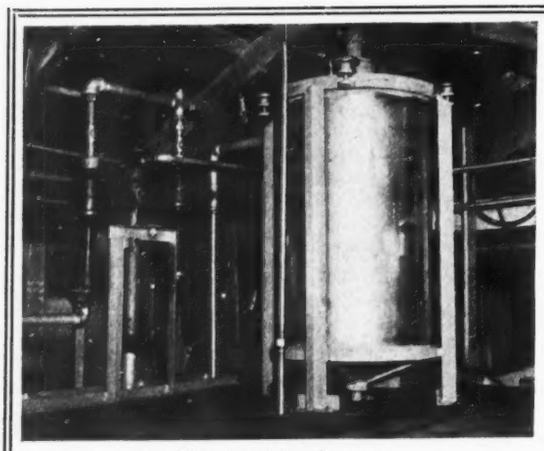
• Without doubt the most widely used fumigant today is hydrocyanic acid gas. LIQUID HCN is hydrocyanic acid gas in the cleanest, most effective and the most versatile form. Ways and means of applying LIQUID HCN effectively to any industrial fumigation problem are available through the Industrial Fumigation Engineer. That is why LIQUID HCN is the fumigant of choice with him — because it enables him to get results —complete insect control. And results are what count with the plant manager or mill superintendent. Here, then, is an unbeatable combination:— An Industrial Fumigation Engineer who knows *how*, using a fumigant that gets *results*.

American Cyanamid & Chemical Corporation

INSECTICIDE DEPARTMENT

30 ROCKEFELLER PLAZA • NEW YORK, N. Y.

KANSAS CITY, MO. • AZUSA, CALIF.



PacRite Atomizing Deaerator

DEAERATION
by the NEW
PacRite Atomizing Principle
plus
PacRite Hi-Speed Processing
for
QUALITY CANNED LIQUID PRODUCTS

In successful commercial operation for nearly two years, the PacRite Deaerator gets its phenominal efficiency by injecting the liquid in finely divided droplets into a high vacuum. Imprisoned air bubbles easily escape by their own internal pressure. Very nearly 100% of the gases may be drawn off. This efficient air removal, together with fast pasteurizing and can cooling has greatly improved the quality of canned liquid food products PacRite processed.

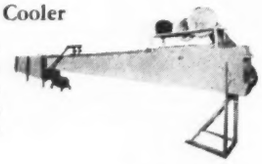
Write for full information.

PacRite Hi-Speed Pasteurizer

Exclusive system of positive water agitation. All stainless steel liquid contact parts. Pasteurizes in 30 seconds. Capacities from 5 to 50 g.p.m.

PacRite Hi-Speed Can Cooler

Individual cans spin under water sprays. Positive speed control. Adjustable for most size cans. Cools in 30 seconds. Built for any capacity.



AMERICAN MACHINERY CORP.
ORLANDO, FLORIDA
"Specialists in Liquid Food Canning Equipment"
PACRITE

crete, brick, stucco, clay, tile, and asbestos siding or similar surfaces. This paint can also be used, when mixed to a mortar-like consistency, for filling cracks or holes in all types of masonry.

The paint is a compound of inorganic materials, containing no oil, casein or cement. It can be applied by brush or spray, setting in three hours and drying in twelve hours. It is claimed by the maker that the surface thus produced is smooth and hard; repels grease and dirt; and can be washed with paint cleaners and washing compounds without marring or destroying the finish; and is unaffected by most industrial acids or fumes. As the product is odorless, it is said to contain no harmful chemicals and is a true white, thus being a good light reflector. The manufacturer recommends it for use in food processing plants.

Refrigeration Compressor

York Ice Machinery Corp., York, Pa., has recently introduced the York-Allis-Chalmers turbo compressor for air conditioning and refrigeration work. This compressor is available in capacities ranging from 150 to 1,000 tons of refrigeration. It is adapted for steam turbine drive, but can be driven by electricity if desired. The refrigeration used is Freon-11. Features claimed for this compressor are low speed operation of impellers, balanced disk compensation of impeller thrust and bladeless diffuser passages for reducing pumping limit and increasing efficiency.

The condensers accompanying these turbo compressors are of non-ferrous internal construction, and the accompanying water cooler is of the flash type non-ferrous construction with hermetically sealed liquid pumps.

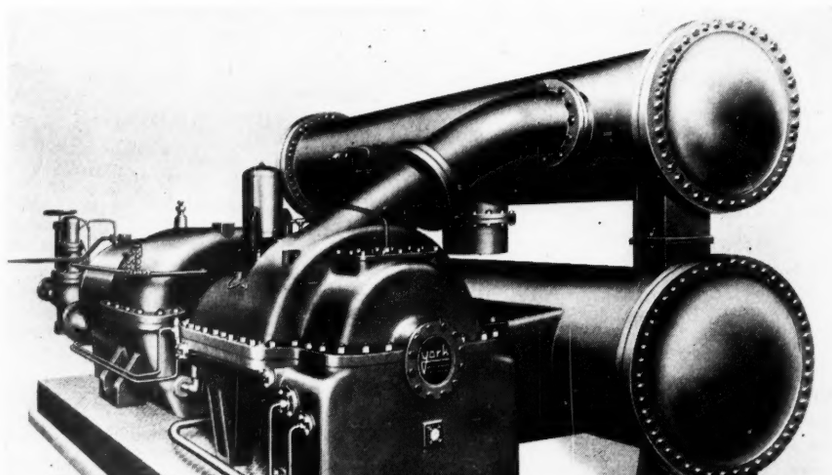
Control systems supplied vary with the type of prime mover employed. Direct drive steam turbine powered compressors are equipped with governors for speed regulation. When electric drive is used, secondary control of variable speed motors, driving through speed increasing gears, is used. Safety devices are provided to assure the constant flow of chilled water and to prevent freezing.

These compressors were developed through cooperation between the engineering organizations of the York Ice Machinery Corp. and the Allis-Chalmers Mfg. Co.

Light-Weight Ladder

Aluminum Ladder Co., Tarentum, Pa., has developed a new type of aluminum ladder which is said to be particularly suited for use in the storage of material and for maintenance work. This ladder, Type 800, is equipped with hand-rails on both sides and has steel or aluminum spikes on the bottom. The aluminum spikes are particularly recommended for use around inflammable materials as they do not cause sparks.

Lengths up to 36 ft. and various widths are available in this ladder.

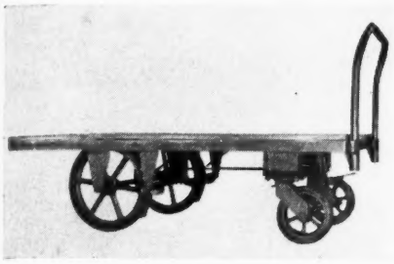


New turbo-compressor for refrigeration and air conditioning use.

The rungs are corrugated to prevent slipping. Because of light weight, it is easy to move this ladder from one part of the plant to another, as required.

Light-Weight Floor Truck

THE SERVICE CASTER & TRUCK CO., Albion, Mich., has developed a new light-weight floor truck having oversized rubber-tired wheels and a new type of foot brake. This truck was designed for use in food warehouses and food manufacturing plants. It is built with a lighter frame than is standard on most trucks of this type, utilizing steel angle plates in place of



Light-weight floor truck.

the usual heavier channel bars. The result is a lighter and more easily handled truck which is still capable of carrying a capacity load of 2,800 lb. The rear wheels are 18 x 2½ in. and the swivel casters in front are 10 in. in diameter. All of these wheels are equipped with rubber tires and Hyatt roller bearings. A cam and brake shoe operating on the large rear wheels is actuated by the pressure on a foot pedal located on the front axle. To apply the brake, the operator merely has to take a half step up. This locks the brake automatically and holds the truck in position.

The deck of this truck is of hardwood, armored with steel on all sides. Overall dimensions are 36 x 72 and the floor clearance is 19⅛ in. The removable handle on the front is 38 in. above the floor.

Roller Chain

MORSE CHAIN CO., Ithaca, N. Y., is making channel-lubricated roller chain which conforms to American Standard dimensions and is completely interchangeable with all other standard roller chains. This is the first time that the self-lubricating feature of Morse chain has been combined with the feature of interchangeability with other standard chains. The new chain is available in single, double, triple and quadruple widths, in all standard pitches, and with standard stock attachments.

How You Can SAFEGUARD PRODUCT QUALITY with Low-Cost Oakite Germicidal Methods

HOT, humid Summer months are the DANGER months for canning and other food product plants. It is the time when bacteria thrive and rapidly multiply . . . when extra vigilance is so vital to maintain necessary sanitary standards.

But you can make your work easier, give your product EXTRA PROTECTION against bacterial contamination and spoilage, by first thoroughly cleaning processing equipment and then using

OAKITE BACTERICIDE

to swiftly destroy contaminating organisms. For this superior, germicidal material, due to its MORE ACTIVE FORM OF AVAILABLE CHLORINE, gives you more CERTAIN CONTROL over bacteria and mold . . . gives you a wider margin of safety in protecting quality and purity. Food plants tell us it is the ideal material for treating all types of processing equipment including sanitary piping, fittings, pumps and utensils. Oakite Bactericide costs little to make up, gives a clear, ready-to-use solution, is free-rinsing and leaves no white residue on equipment.

OVER 53 DIFFERENT OAKITE MATERIALS AVAILABLE

Whatever food products you pack in tin or glass . . . you will find there are Oakite cleaning and germicidal materials and methods available that will help you clean faster, more thoroughly, at lower cost and safeguard your product more effectively against contaminating bacteria.

Inasmuch as all Oakite materials are backed by a binding GUARANTEE, investigate today the many advantages and benefits they provide. Write for FREE booklets on your industry!

OAKITE *Certified* **CLEANING**

Complete Nation-Wide Service For These Industries

•

CANNING
CEREAL PRODUCTS
MEAT PACKING
SEA FOOD
BOTTLING
ICE CREAM
BAKING
DAIRY
BREWING

Manufactured only by

OAKITE PRODUCTS, INC., 26G THAMES ST., NEW YORK, N. Y.
Representatives in All Principal Cities of the United States and Canada

Food Technology

NEW DISCOVERIES & INVENTIONS

FOOD TECHNOLOGY

Viscosity and Heat Transfer

IN "STILL" PROCESSING, no exact relationship between viscosity and rate of heat penetration seems to exist for tomato juice, except in cases where the differences in viscosity are significant. Wherever such a correlation is found, the effect of increasing "thickness" is to slow down the rate of heat penetration. Improved methods of viscosity determination may permit the establishment of a correlation sufficiently well defined to permit some degree of technical control.

Processes involving agitation diminish the importance of viscosity. Other factors, nevertheless, such as head space and degree and kind of agitation, must be considered. Rotation of the cans in the heating bath on their long or cylindrical axis, either continuously or intermittently, promises to reduce processing time by as much as 80 to 85 percent when properly used and controlled. It is to be expected that beyond a certain viscosity this factor also becomes of importance in agitated cooking processes. Even a gentle swaying motion imparted to cans immersed in a moderately turbulent heating bath greatly increases the rate of temperature rise.

A great deal of research is necessary before it will be possible to calculate the processing of tomato juice as it is done for non-acid products.

Digest from "Heat Penetration in Tomato Juice," presented by H. P. Stevens before the National Canners Convention at Chicago, January, 1940.

Improved Preservation In Cold Storage

IT IS NOT EASY to enhance the effects of simple cold by destroying bacteria and fungi, or by influencing processes occurring in the interior of food products, but some progress has been made in accessory treatments for cold storage foods.

Treatment with chemicals has not been successful because alcohols, phenols, organic acids, iodine, o-phenylphenol and other chemicals are likely to be harmful to the food product if used in effective strengths. Similarly, not much can be accomplished in retarding ripening of fruits with maleic acid or in preserving meats with acidified brine (10 percent salt, 0.2 percent hydrochloric acid) without injury to the treated product.

Better success has been achieved with special wrappers, such as waxed paper for apples, transparent cellulose for frozen foods and the like. Irradiation with ultra-violet light is also a helpful expedient in some cases, as in surface sterilization of meats and fish, sterilization of milk, freezer brines and other liquids, and destruction of molds on tomatoes, strawberries or peaches. But some foods, among them bananas and celery, are too sensitive to ultra-violet light and must be treated by some other method.

Storage in special atmospheres gives good results for some foods, particularly carbon dioxide for fruits, vegetables, meats, fish, fats and eggs. Ripening of some fruits can be greatly retarded by low temperatures in the absence of atmospheric oxygen, as in carbon dioxide, but oxygen need not be removed if a powerful antioxidant gas is introduced. As little as 0.0015 percent sulphur dioxide, or 1 percent ammonia, lessens spoilage of tomatoes and oranges in cold storage in air.

Digest from "Accessory Treatments in Cold Storage Preservation of Foods," by G. Kaess. *Naturwissenschaften* 28, 103, 1940 (Published in Germany).

BAKERY PRODUCTS

Adjusting Sponge Cake Formulas to Altitude

THE PRONOUNCED EFFECTS of altitude on the baking characteristics of yellow sponge cake can be overcome by adjusting the specific gravity–altitude relationship. Too light batters are the most frequent cause for sponge cake failures at high altitudes.

Proper coagulation of the egg proteins and starch gelatinization at the temperatures reached inside the cake during baking depend largely upon the sugar: water ratio, high sucrose concentrations tending to inhibit both reactions. Other factors influencing the cake structure are the quality of the eggs and their age. High quality eggs affect the cake structure differently than low quality eggs, regardless of age. Deterioration of eggs in storage produces an effect in the finished cake similar to that of a higher altitude. (Eggs stored for one month at 20 deg. C. at 5,000 ft. altitude require a formula correction equivalent to that necessary for baking a cake with fresh eggs at 9,000 ft.) High quality frozen eggs produce an excellent sponge cake.

Cream of tartar, added to the egg magma, facilitates meringue production. Lemon juice and gratings, frequently used for flavor, should be added during or at the end of flour incorporation. Typical high grade, low protein, all-soft-wheat cake flours give the best results.

At higher altitudes, specific gravity corrections are achieved by increasing the moisture content and the amount of flour (sugar and eggs remaining the same), continuing stirring at low speed, if necessary, until a standard cup of the batter gives the required net weight.

(Formulas for whole-egg and yolk sponge cakes, with adjustments for different altitudes, are to be republished later under Formulas for Foods in FOOD INDUSTRIES. These formulas, together with improved mixing methods which produce cakes of superior quality at all altitudes, are especially recommendable for low altitudes where sponge cakes tend to be tough. —The Editors.)

Digest from "Preparing and Baking Yellow Sponge Cake at Different Altitudes," by W. E. Pyke and G. Johnson, Colorado Experiment Station Technical Bulletin No. 27, February, 1940.

BEVERAGES

Sherry-flavored Wine Made From "Foxy" Grapes

SPEEDING UP the development of a sherry flavor in wine by diffusing air or oxygen through the wine held at 130 to 140 deg. F. is only a part of the invention divulged in U. S. Patent No. 2,181,839. When the method is applied to wine made from Concord and other grapes having the "foxy" odor and flavor of the *Vitis labrusca*

Why Viviano likes Wear-Ever® KETTLES

One of the battery of Wear-Ever Aluminum Kettles used by the S. Viviano Macaroni Mfg. Co., Carnegie, Pa., for cooking spaghetti sauces.

1. Cook evenly at top and bottom; no hot spots, no scorching.

2. Easy to keep clean, inside and out; never need tinning.

3. Have no effect on natural color and flavor of food.

4. Built strong to stand hard use for years and years.

5. Save money; both first cost and maintenance are low.

In all the hundreds of plants and kitchens where Wear-Ever Steam Jacketed Kettles are used, you'll hear these same reasons why they are preferred. Try them and you'll join the chorus of satisfied users.

WEAR-EVER ALUMINUM TRADE MARK REG. U.S. PAT. OFF.

"Wear-Ever" ALUMINUM

THE STANDARD: WROUGHT OF EXTRA HARD, THICK ALUMINUM

MAIL THIS COUPON TODAY

The Aluminum Cooking Utensil Company,
305 Wear-Ever Bldg., New Kensington, Pa.

Gentlemen: Send complete information about Wear Ever Aluminum Steam Jacketed Kettles.

Name_____

Address_____

City_____ State_____

species, that "foxiness" is dispelled also.

Because of the deep color of the Concord and the "foxiness" of all the low priced, hardy, eastern U.S.A. grape wines, they have not heretofore been as suitable for sherry wine making as are the delicately flavored and twice as expensive wines made from West Coast grapes of the *Vitis vinifera* species.

As outlined in this patent granted to D. K. Tressler, Geneva, N. Y., and assigned to the Cornell Research Foundation, Inc., Ithaca, N. Y., the removal of the color, odor and flavor may be accomplished before and during the sherry-flavor developing period.

By treating cold-pressed Concord grape wine with 0.1 per cent decolorizing carbon followed by filtration, a secondary treatment with 0.1 per cent of bentonite and a second filtration, a wine low in color and bland in flavor results. This wine when held at approximately 135 deg. F. for three weeks in a coil-heated vat and aerated with minute bubbles of air diffused into the wine at the bottom of the vat develops the characteristic sherry flavor, whereas ordinarily three months is required.

Use of decolorizing carbon, bentonite and accompanying filtration can be avoided by subjecting the Concord grape wine to six weeks of heating at 135 deg. F. with air aeration, or to four weeks of heating with oxygen aeration. The trap vent at the top of the vat is partly filled with glass balls and cold wine to collect the flavorsome aldehydes and esters from the escaping vapors and return them to the wine in the vat.

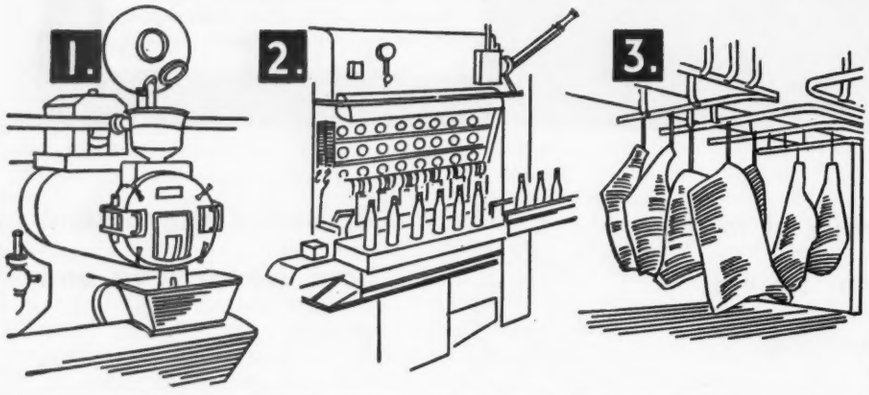
Adjustment of the high acidity of Concord grape wine to approximately 0.45 per cent as tartaric acid by adding a calculated quantity of K_2CO_3 after sweetening to a 2 to 10 per cent sugar content, but before the heating and aeration treatment, gives best results by speeding up the formation of the desired aldehydes and esters.

Fortifying to an 18.5 to 20 per cent alcohol content is done by the conventional method of adding grape brandy. Other operations common to wine making are done in the conventional manner.

Blending of wines from such grapes as Concords, Niagaras, Catawbas and Clintons may be done, and the treatment may be varied in its details to obtain sherrys of individual character.

HTH PRODUCTS*

Cut Spoilage Losses, Protect Purity



1. To protect the quality and purity of ice cream, all containers and equipment—cans, freezers, pasteurizers, homogenizers, etc.—must be kept not only clean but germ-free. That is why HTH Products are used in so many successful ice cream plants.

2. The sanitation problem of the beverage bottler is two-fold. His products must meet rigid public health requirements and they must be free from molds, yeasts and other micro-organisms that cause spoilage—a job made-to-order for HTH Products.

3. Meat packers find HTH Products effective and dependable for sanitation in every part of the plant—edible rooms, killing floors, cookers, freezers, curing rooms, smoked-meat hanging rooms, cutting rooms, sausage manufacturing rooms, sliced-bacon coolers, etc.

Food and beverage plants cannot lose a single round in the constant battle against bacterial contamination without suffering substantial dollars-and-cents loss.

Save money—fight spoilage this simple, effective way. Use HTH Products for complete plant sterilization.

HTH Products are dependable chlorine sterilizers in powder form—convenient to use, always full-strength, quickly effective in action. Added to water, they make germicidal hypochlorite solutions of the desired strengths for flushing or spraying all surfaces with which food or beverage products come in contact. And HTH Products are so economical, they can be used freely throughout the plant.

Send today for full information on how HTH Products can prevent spoilage and protect the quality of *your* products.

HTH PRODUCTS

THE MATHIESON ALKALI WORKS (INC.) 60 EAST 42ND STREET, NEW YORK, N. Y.

*HTH PRODUCTS (HTH, HTH-15 and LO-BAX) . . . DRY ICE . . . LIQUID CARBON DIOXIDE . . . AMMONIA, ANHYDROUS and AQUA . . . CAUSTIC SODA . . . SODA ASH . . . BICARBONATE OF SODA . . . LIQUID CHLORINE . . . BLEACHING POWDER . . . PH-PLUS (FUSED ALKALI)

DAIRY PRODUCTS

"Ersatz" Culture Mediums For Milk Examination

THE GERMAN DRIVE toward autarchy through the development of "Ersatz" materials to replace imported products has led even into the dairy laboratory. Such old familiar culture medium ingredients as agar, meat extract and peptone must give way to "Ersatz" mediums. It is even claimed that the new mediums are superior in clarity and in number and size of colonies.

For use in the bacteriological examination of milk and dairy products good results were obtained with "Kiebo" culture plates, which are made by forming a sol of waterglass and adding a nutrient such as yeast extract. The best buffer effect is obtained by choosing phosphoric acid as the acidifying agent. The sodium chloride content of the medium should be adjusted to give an isotonic solution. A suitable nutrient such as yeast extract, is added to the waterglass sol under appropriate conditions of temperature, acidity and concentration so that the sol sets to a gel neither too rapidly nor too slowly.

The plates are excellent for making

bacterial counts, especially of *B. coli,* because the nutrient gel is perfectly clear and transparent, so that small colonies are easy to see.

Digest from "Bacteriological Examination of Milk with Substitute Nutrients," by H. O. Hettche and H. Münch, *Zentralblatt für Bakteriologie* II, 101, 337, 1940 (Published in Germany).

A Little Tomato Juice For Better Butter Cultures

DIACETYL, which is a major factor in butter flavor and aroma, is formed by citric acid fermenting organisms of the streptococcus type. So also is acetylmethyl-carbinol, which is odorless but is the parent compound of diacetyl and so is important in butter making.

Butter cultures, using *Streptococcus lactis* and added citric acids as aids toward high flavor and aroma, yield more acteylmethyl-carbinol and diacetyl if tomato juice is added to the culture. This unexpected observation has not been fully explained as yet, because the substance responsible for increasing the yield has not been identified, but a study of the effect has brought out some useful practical information. As little as 1 percent of added tomato juice raised the diacetyl yield 31.1 percent, and 10 percent of juice doubled the yield, but too much tomato juice has the opposite effect. Thus, with 40 percent tomato juice a culture gave 41.1 percent less diacetyl than with no juice at all.

Some canned tomato juices are as potent as fresh juice, others not. Maceration juice from dried tomato slices was as potent as fresh juice. Red and yellow tomatoes seem to be equally effective. The juice is not very heat sensitive, but sterilization causes some loss of potency. It is suggested that if canned or preserved juice is used it should first be assayed against fresh juice of known potency.

Digest from "Effects of Tomato Juice on Production of Flavor Contributants in Butter Cultures," by Clement W. Abbott, Doctoral Dissertation No. 521, Iowa State College, Ames, Iowa. 1939.

CANNING & PRESERVING

Calcium Increases Firmness In Canned Tomatoes

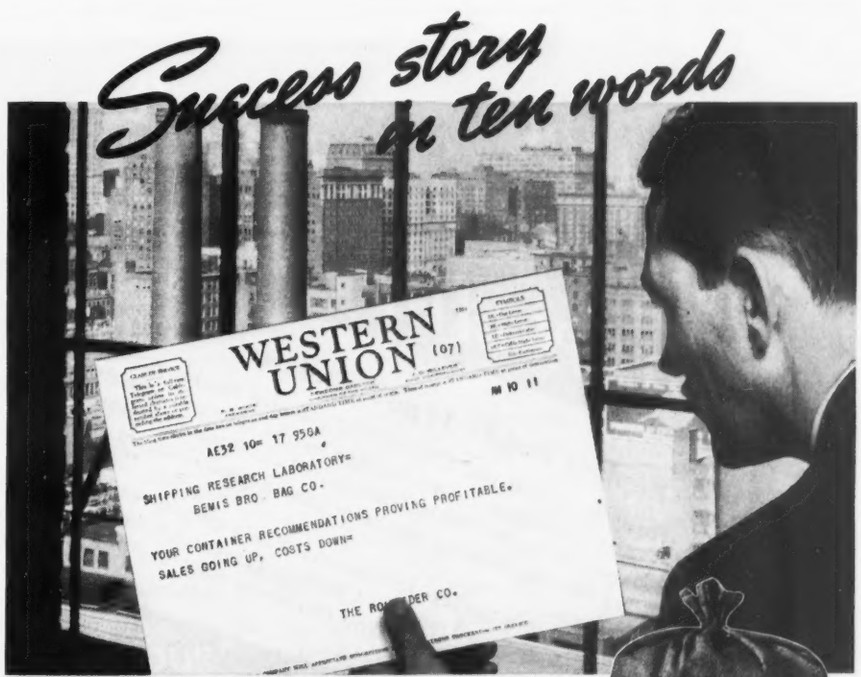
PACKING COMMERCIALLY canned whole tomatoes with added calcium chloride results in a firmer product, superior in appearance and more resistant to abuse during shipment. Subsequently to dipping the peeled tomatoes into a calcium chloride solution (2 percent) for 2 minutes, the fruit is rinsed in cold water and canned as usual. Under these conditions one ton of tomatoes takes up about 5 to 6 oz. of calcium, the equivalent of 1 lb. of calcium chloride. The chemical costs approximately 5 cents per ton of tomatoes.

The calcium may also be added didectly to the can, the amount depending upon the softness of the fruit. Best results were obtained with the following quantities:

Condition of tomatoes: Firm or somewhat soft require about 0.083 percent of calcium chloride or 7½ grains per No. 2 size can; soft tomatoes, 0.111 percent or 10 grains per can; and very soft, 0.139 percent or 12½ grains per can. The calcium chloride added to the can must be a purer grade than that used for dipping. Salt tablets, containing 22½ grains of table salt and 7½ grains of calcium chloride, are very convenient for placing into the can with the tomatoes or for dissolving in the juice.

Calcium gluconate has no advantage over calcium chloride for this purpose; calcium lactate and acetate are inferior to the chloride.

All samples in which firmness was improved showed an increase in the


Success story in ten words
WESTERN UNION
SHIPPING RESEARCH LABORATORY=
BEMIS BRO BAG CO.
YOUR CONTAINER RECOMMENDATIONS PROVING PROFITABLE.
SALES GOING UP, COSTS DOWN=

Read how the Bemis Shipping Research Laboratory has helped increase sales and lower costs for many manufacturers of food products requiring special protection

Remarkable improvement is being made in shipping containers for dry food products. Unless you've had a complete container check-up recently, there's a good chance Bemis Research Engineers can both lower your costs and increase your sales.

Container recommendations developed by the Bemis method of analyzing specific needs have greatly reduced damage in transit and storage, lowered freight and handling costs, increased advertising value, and created valuable goodwill . . . even where the container used previously had been considered satisfactory.

Meeting special needs has produced a wide variety of tried and tested Bemis Waterproof Bag constructions. One of these may just fit your particular product and shipping conditions. If not, the Bemis Shipping Research Laboratory will endeavor to create a new one for you.

Have your container set-up analyzed for extra profit opportunities

It will pay you to know whether your sales and profits are being handicapped by your containers. Without obligation, the Bemis Shipping Research Laboratory will study your particular needs and submit a complete report with recommendations, *if needed.* Phone or write today. Or mail coupon below for the new Bemis Brochure giving valuable suggestions for better shipping.

Waterproof Department
BEMIS BRO. BAG CO.
402 Poplar Street, St. Louis
5108 Second Avenue, Brooklyn

BEMIS BRO. BAG CO., 402 Poplar Street, St. Louis, Missouri
5108 Second Avenue, Brooklyn, New York
Please send your special brochure and details about use of Bemis Waterproof Bags for_____(product)
*Firm Name*_____
*Street Address*_____
*City*_____ *State*_____
*Mark for the attention of*_____

calcium content of the tomatoes of at least 76 p.p.m., the best results being obtained with an increase of 150 to 200 p.p.m. Untreated tomatoes canned under commercial conditions contain from 44 to 98 p.p.m. calcium, with an average of 66.2 p.p.m.

Digest from "The Application of Calcium in the Commercial Canning of Whole Tomatoes," presented by Z. I. Kertesz, T. G. Tolman, J. D. Loconti and E. H. Ruyle before the National Canners Convention at Chicago, January, 1940.

How to Can Apple Juice

WITH THE DANGER of corrosion by acid fruit juices eliminated by recent improvements in cans and can enamels, the canning of apple juice, cider and similar fruit products has been developed into commercially feasible procedures. Selection of the type of juice to pack is dependent upon whether clear juice, turbid juice without appreciable sediment, or very cloudy juice containing a heavy sediment is desired.

Fully matured apples produce a superior flavor; hard-ripe fruit juices are weak and lacking in flavor; overripe fruit imparts an old or musty odor and taste. Bentonite has been found satisfactory for the clarification of apple juice.

Deaeration prior to flash pasteurization (11.7 seconds at a coil outlet temperature of 195 deg. F.), filling into cans, and hot closure, followed by prompt and thorough water cooling, have a beneficial effect in the retention of the original aroma and flavor of the juice. A cooked taste develops due to delay in cooling or to inadequate cooling. Holding for 1 minute at 190 deg. F. is equally as satisfactory as 3 to 4 minutes at 170 to 175 deg. F.

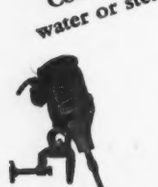
Type L coke tin plate cans, suitably lined, give satisfactory results, but plain tin plate cans bleach the juice and develop off-odors and flavors within a short time.

Digest from "The Canning of Apple Juice," by H. L. Sipple, G. H. McDonnell and R. H. Lueck. Presented before the Canning Problems Conference of National Canners Association, Chicago, January, 1940.

Reduce YOUR MIXING COSTS THE SANITARY "LIGHTNIN" WAY

Replace Paddle Type Agitators

It has been repeatedly proved that LIGHTNIN Patented Double Action Propeller Type Mixing cuts power costs, reduces mixing time and entirely eliminates dead-spots. Complete line includes geared and direct drive portables, top entering and side entering mixers for mixing quantities from one to one million gallons. Completely sanitary. No pockets for bacteria. Easily cleaned with hot water or steam. Sanitary sealed out-board bearing prevents oil or grease from this source contaminating mix.



"Lightnin" Variable Speed Mixers operate from 100 to 1800 R. P. M.

"Lightnin" Portable Mixers (geared and direct drive) range in size from 1/30 to 10 H. P.

"Lightnin" Top Entering Units (geared and direct drive) for open or closed tank work including pressure and vacuum work.

"Lightnin" Side Entering Units for tanks up to 1,000,000 gals.

"LIGHTNIN" SAVES MONEY MIXING

Carbonated Beverages
Tomato Products
Fruit Juices—Jellies—Jams
Preserves—Lard—Milk
Ice Cream Mix—Milk Drinks
Buttermilk—Bakery Supplies
Soups—Brines—Syrups
Vinegar—Wines
Yeast Products—Flavorings
Fruit Pulp—Extracts
Vegetable Dyes—Baby Foods
Premixing Mayonnaise and Salad Dressings
Sherbet—Honey
Beer—Distilled Spirits
Meat Sauces—Vegetable Oils
Vegetable Butters
Mincemeat—Cod Liver Oil

MIXING EQUIPMENT CO., INC.
1043 Garson Ave., Rochester, N. Y.
Please send me:
☐ Bulletin B-65—Portable Mixer.
☐ Bulletin B-63—Top Entering Mixer.
☐ Bulletin B-62—Side Entering Mixer.
☐ Mixing Equipment Work Sheet.

Name_____
Title_____
Company_____
Address_____

MIXING EQUIPMENT CO., INC.
1043 Garson Ave., Rochester, N, Y.

MANUFACTURERS OF LIGHTNIN PROPELLER TYPE MIXERS

FATS AND OILS

Oxidized Soybean Oil In Margarine (Palsgaard's Emulsion Oil)

AN EMULSION AID much used in margarine manufacture is composed of oxidized soybean oil and peanut oil in the ratio 1:2. The amount added to margarine varies but is generally 1 per cent or less. Digestibility of such emulsion oils is a problem which needs attention since consumption is comparatively large. Tests were therefore made with white rats.

The tests showed 7.67 per cent of the emulsion oil intake to be eliminated unchanged in one test series, and 8.83 per cent in another series. This shows that oxidized soybean oil is over 90 per cent digestible.

Digest from "Digestibility of Oxidized Soy Bean Oil (Palsgaard's Emulsion Oil)," by H. R. Kanitz, *Zeitschrift fur Untersuchung der Lebensmittel* 78, 385, 1939 (Published in Germany).

MEAT PRODUCTS

How to Tell Beef from Mutton In Sausage

MUTTON AND BEEF have sufficient chemical and physical similarity to make separate identification difficult in their mixtures. Qualitative and quantitative tests for glycogen do not distinguish between them, nor does the determination of chemical and physical constants in the fats which accompany the meat. But the serum method, in which a highly selective precipitating agent (called a precipitin) is made from proteins of the animal, permits positive identification.

A protein extract, derived from the

animal for which meat is to be tested, is injected into a rabbit. The rabbit serum then acquires the property of forming a precipitate in filtrate from any protein extract obtained from the same kind of meat. This reaction is highly specific and has been successfully applied to the problem of distinguishing between mutton and beef, even though sheep and cows are closely related zoölogically.

Sausages, in raw casings, were tested after three, six and nine months of storage. The samples were made of pure beef, pure mutton and mixtures containing 5, 10, 25, 50, 75, 90 and 95 percent beef. Every precipitin test was positive excepting those with beef precipitin in pure mutton, and mutton precipitin in pure beef. It was estimated that each precipitin was sensitive to 1:1,000 for the specific reaction.

Digest from "Biological Assay of Sausage in Raw Casings for Distinction Between Mutton and Beef," by Aldo Peigai, *Industria italiana delle conserve* 14, 135, 1939 (Published in Italy).

PICKLING

Lactic Acid for Pickles—III.

AN IDEAL PICKLE FLAVOR is one that blends all individual taste sensations, such as sour, sweet, spicy or salty, without leaving any one predominant. It must be well balanced. A standard terminology for describing organoleptic test results is suggested for sweet pickles and relish.

When used alone, lactic acid makes sour pickles too sour in concentrations necessary to prevent spoilage. In combination with acetic acid it adds nothing to the flavor but detracts from the keeping quality. Therefore, lactic acid alone, or together with acetic acid, is not suitable for making sour pickles.

Neither does lactic acid alone produce good results in the production of sweet pickles or relish, however, it greatly improves their flavor when used in ratios of 1.6 to 0.4, or 1.8 to 0.2 per cent of acetic to lactic acid.

Additions of lactic acid to processed dill pickles in ratios of 1 to 0.2 per cent; 0.8 to 0.4 per cent, or 0.6 to 0.6 per cent acetic acid to lactic acid constitute a decided flavor improvement in this product over one made with acetic acid alone. Best results are obtained when a combination of lactic acid and distilled or white vinegar is used.

Digest from "Use of Lactic Acid in Pickles and Related Products," by F. W. Fabian and C. K. Wadsworth, *Food Research* 4, 521, 1939.

FROZEN FOODS

Thiamin Content of Foods

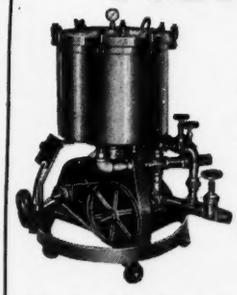
VITAMIN B_1, or thiamin (so-called for its sulphur content), is widely distributed in both vegetable and animal tissues. B_1, believed to be concerned in the conversion of carbohydrates to fat, was isolated from rice polishings by Williams.

Approximately 100 different food items, including, fruits, vegetables, cereals, meats and dairy products, are arranged according to their vitamin B_1 content in terms of crystalline thiamin into four groups: excellent, good, fair, poor. The most important natural food sources of vitamin B_1 are whole-grain cereals, legumes, nuts and lean pork, in both the fresh and the cured condition.

Among animal tissues liver, heart, kidneys and pork muscle are conspicuously high in B_1, whereas food derived from plant tissues are, in general, not rich sources for this vitamin. Foods listed under "poor", such as milk and potatoes, may furnish appreciable amounts of the daily vitamin requirement for B_1 if consumed in large quantities.

Digest from "The Vitamin B_1 Content of Foods in Terms of Crystalline Thiamin," by L. E. Booher and E. R. Hartzler, U. S. Dept. of Agriculture, Technical Bulletin No. 707, 1939.

GET FASTER RESULTS
. . . Save waste and money with this modern
SPARKLER FILTER



More uniform filter cake, therefore, more uniform and better quality. Simpler and easier cleaning. Has large capacity.

The Sparkler filter plates are nested on top of each other in a horizontal position. The filtering process is always straight downward only. Filter cake lays in flat horizontal position, giving you such benefits as: more uniform coating — less time for precoating — ability to build and hold thicker cake. Let us give you all the facts — see why Sparkler saves money for you.

SPARKLER MFG. CO.
1210 WEBSTER AVENUE, CHICAGO

MICRO-FILM DEAERATION

Prevents "black-neck," removes unsightly air bubbles, minimizes separation in catsup.

MICRO-FILM deaeration of beverage concentrates is very essential since it not only reduces oxidative changes but increases filling speed by eliminating foaming.

The deaerator removes practically all dissolved and occluded air from liquid products; has automatic controls; is stainless fabricated; can be cleaned in five minutes.

WHAT DO YOU PROCESS?

Grapefruit juice	Apple juice
Pineapple juice	Concentrates
Grape juice	Catsup
Papaya juice	Tomato juice

GET COMPLETE DETAILS

THERMAL RESEARCH CORPORATION
Manufacturers of high speed pasteurizers, coolers, deaerators, and heat exchangers.
RICHMOND, VIRGINIA U. S. A.

Books

Food Abstracts

INDEX TO THE LITERATURE OF FOOD INVESTIGATION. Issued periodically by Department of Scientific and Industrial Research, London. Available from British Library of Information, 50 Rockefeller Plaza, New York, N. Y. Price, $1.35 each for Nos. 1, 2 and 3 of Volume 11.

There are now available for distribution in the United States several recent quarterly issues of this British periodical document. It represents an important compilation of abstracts on many phases of food research. Operating executives with technical problems, as well as research laboratories, will profitably consult these documents regularly to take advantage of the results of scientific and engineering investigations made throughout the world.

Standardize with

TRI-CLOVER

Sanitary Fittings and Pumps

The Tri-Clover Line is definitely the leader in its field. A large majority of dairy equipment houses stock and recommend Tri-Clover products.

We are specialists in sanitary fittings and pumps. We manufacture and maintain in stock every conceivable type of sanitary fitting . . . in nickel alloy, plated bronze and stainless steel. Tri-Clover fittings and pumps are easily disassembled for thorough cleaning. No inside pockets or crevices to hold bacterial deposits . . . no rust or corrosion . . . this type of fitting will save you money.

Let our engineers help you modernize and economize with Tri-Clover Sanitary Fittings and Pumps. Write for prices and complete information.

Try TRI-CLOVER "THE Complete LINE"

TRI-CLOVER MACHINE COMPANY
KENOSHA • WISCONSIN

World's largest manufacturer of stainless steel sanitary fittings

Use of Dextrose, Corn Sirup

DEXTROSE AND CORN SYRUPS IN THE PRESERVING INDUSTRY. By E. H. Wiegand, W. R. Fetzer, K. J. Seulke and D. K. Tressler. Published by Corn Industries Research Foundation, 270 Broadway, New York, N. Y. 1940. 31 pages; 8½x11 in.; mimeographed; paper. Free.

This is a collection of addresses before American Preservers Association in January, 1940. The papers cover "Dextrose in the Preserving Industry," "The Use of Corn Syrup in the Manufacture of Jams and Preserves," "High Conversion Corn Syrups," and "The Use of High Conversion Corn Syrup in Making Jellies, Jams and Fruit Butters."

The information has practical value to food technologists.

Minerals in Nutrition

MINERAL METABOLISM. By Alfred T. Stohl. Published by Reinhold Publishing Corp., 330 W. 42d St., New York, N. Y. 1939. 384 pages; 6¼x9¼ in; cloth. Price, $5.

Those in the food industries who are students of nutrition will find useful information in this book. The principal function of the work is to describe the rôle of the minerals in the structure and function of the human body. The field of mineral metabolism is in a state of rapid expansion.

House-to-House Operations

HOME TO HOME BAKERY OPERATION. By N. J. Jamieson. Published by Bakers' Helper Co., 330 S. Wells St., Chicago, Ill., 1940. 187 pages; 5½x8¼ in.; cloth. Price $1.

How to manage, buy, bake, distribute and sell are discussed in this little book. The author, with 23 years' experience in managing bakeries, begins with the basic features of home-to-home operation and ends with how to control production costs. In between he hits 18 other fundamental problems, including plant location, selection of customers, delivery equipment, purchasing, selling and advertising.

Appealing to the Male

COOKING AS MEN LIKE IT. By J. George Frederick. Published by Business Bourse, 80 W. 40th St., New York, N. Y. 1939. 172 pages; 8¼x5½ in.; cloth. Price. $2.50.

This book is a comprehensive treatment of various ways to please the masculine appetite. It is of value to food manufacturers who wish to slant their products or promotion to the man's taste, thereby helping the housewife solve one of her food problems.

Patents

Milk Irradiated While Flowing Over Surface Having a Series of Protuberances Staggered in Rows—Charles B. Dalzell, Little Falls, N. Y., to Cherry Burrell Corp., Wilmington, Del. No. 2,193,225. March 12, 1940.

European-type Cheese Making Put on Mechanical Basis to Cut Production Cost—Raymond Miollis, Chicago, Ill. No. 2,193,462. March 12, 1940.

Gum or Jelly Type Confections Made From Thin-boiling Canna Starch—Carl Bergquist, Stockholm, Sweden to Corn Products Refining Co., New York, N. Y. No. 2,193,470. March 12, 1940.

Bakery Products Protected Against Mold Growth by Storage in Atmosphere Containing Hydrogen Peroxide and Regulated as to Water Vapor Pressure by Use of a Stable Ammonium Salt of a Strong Mineral Acid—Marion D. Coulter, Pittsburgh, Pa., to Toledo Scale Mfg. Co. No. 2,193,622. March 12, 1940.

Fresh Fruit Protected Against Deterioration by Air or Wrappers Containing Betaine Iodide—Albert E. Marshall, New York, N. Y., to Tolco, Inc., Toledo, Ohio. No. 2,193,636. March 12, 1940.

Ice Cream, Sherbets and the Like With a Regulated, Uniform Overrun Made on a Continuous Basis—Clarence W. Vogt, Norwalk, Conn., to Girdler Corp., Louisville, Ky. Reissue No. 21,406. March 19, 1940.

Lecithin Dissolved in Ethyl Lactate to Form Water Dispersible Product—Stroud Jordan, Brooklyn, N Y. No. 2,193,873. March 19, 1940.

Vitamin B Complex Recovered From Brewers' Yeast in Solvent Which Does Not Materially Swell Yeast Cell—Ben Maizel, Milwaukee, Wis., to Vico Products Co., Chicago, Ill. No. 2,193,876. March 19, 1940.

Sugar Crystals From Supersaturated Solutions Formed in Such a Way as to Avoid Sandiness and to Give Products Containing the Sirup a Smooth Consistency—Grover D. Turnbow, one-half to C. E. Gray, Oakland, Calif. No. 2,193,950. March 19, 1940.

Milk Treated to Increase Its Vitamin B Content and the Vitamin B Constituents Separated From the Proteins by pH Adjustment of the Dispersion to Precipitate the Proteins—George C. Supplee, Bainbridge, N. Y., to Borden Co., New York, N. Y. No. 2,194,188. March 19, 1940.

Raw Sugar Sirups Purified by Heating in Presence of Baceeda Glucoside, Silicious Diatoms and a Coagulant—Leopold Charles Ambrose Feurtado, Kingston, Island of Jamaica, British West Indies. No. 2,194,195. March 19, 1940.

Salts of Metal Lower Than Sodium in Electromotive Series Removed From Starch Converted Dextrose Liquors by Use of Zeolite—Harry Meisel, North Bergen, N. J., to Corn Products Refining Co., New York, N. Y. No. 2,194,315. March 19, 1940.

Coffee Packaged in Containers Made From Strips of Sheet Rubber—Leonard D. Soubier, Toledo, Ohio, to Owens-Illinois Glass Co. No. 2,194,451. March 19, 1940.

Lecithin From Soybean Given a Controlled Soft Consistency by Increasing the Free Fatty Acid Content of the Fatty Oil Constituent of the Lecithin Mixture—Gustav Adolf Wiesehahn, New York, N. Y., to American Lecithin Co., Cleveland, Ohio. No. 2,194,842. March 26, 1940.

Rice and Similar Grains Subjected to Steam Under Pressure and Temperature of at Least 100 Deg. C. During Addition of Water in Measured Quantities to Obtain Cooked Mass of Loose Grain Texture—Arthur R. Choppin, Baton Rouge, La., and Eleanor L. Winborn, Lumberton, Miss., to Rice Millers' Association, New Orleans, La. No. 2,195,165. March 26, 1940.

Starch-containing Materials Digested in a Column Comprising a Series of Superimposed Units With Diaphragm Dividing Each Unit Into an Upper and Lower Chamber With Interconnections to Permit Supplying of Steam to Upper Chamber of Each Unit in the Column—Alexander Loginov, Moscow, Union of Soviet Socialist Republics. No. 2,195,335. March 26, 1940.

Bakery Doughs Shaped Into Loaf Form by Driven Roller Working in Combination With Conveyor for the Dough—Hendrik Verheij, Rotterdam, Netherlands. No. 2,195,346. March 26, 1940.

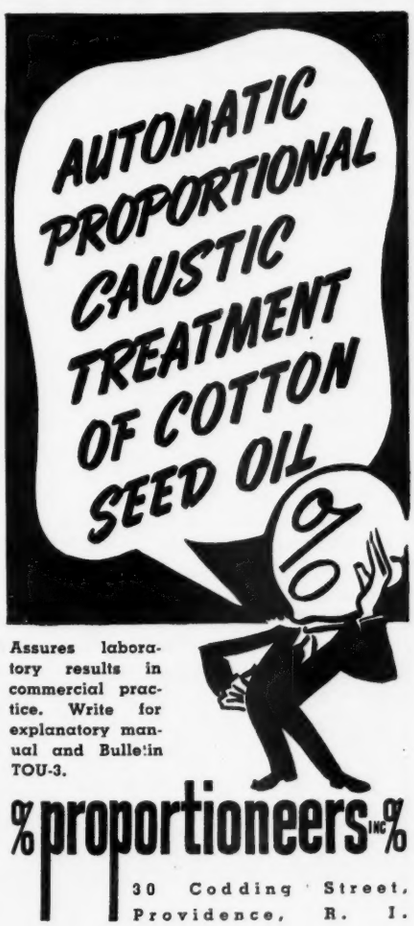
Milk and Other Liquid or Semi-liquid Foods Freed From Dissolved Gases by Replacement With Oxygen, Heated to Destroy Pathogenic Organisms and to be Substantially Sterile in an Oxygen Atmosphere Under a Pressure of 6 to 21 Atmospheres at a Temperature Not Exceeding 80 Deg. C., Cooled and Stored in an Oxygen Atmosphere—Karl Richter, Kiel, Germany, to Metra Maatschappij voor Verduurzaming van Zuivelproducten N. V., Amsterdam, Netherlands. No. 2,195,469. April 2, 1940.

Gelatin Dessert Mixtures in Water Solution Given a Fast Setting Time by Repressing Ionization of Acid Content Without Effecting Adversely Their Palatibility—William Rowland Collins, Woodhaven, N. Y., to Standard Brands, Inc., New York, N. Y. No. 2,196,146. April 2, 1940.

Fresh Fruits Given a Protective Coating Which is Substantially Dry and Non-tacky When Dried Down to a Substantially Continuous and Adherent Film—Miles L. Trowbridge and Charles D. Cothram, Pomona, Calif., to Brogdex Co., Winter Haven, Fla. No. 2,196,164. April 2, 1940.

Beer Lines Cleaned by Use of System Connecting Cleaner Supply Receptacle With Lines Leading to Emptied Keg—Ernest H. Brigham to Protecto Co., Inc., Chicago, Ill. No. 2,196,176. April 9, 1940.

Diacetyl Developed in Butter Cultures Containing Citric Acid and Citric Acid Fermenting Bacteria by Ripening Culture Under Air Pressure of 30 lb. per Square Inch and Keeping in Continuous Agitation—Chester Hamlin Werkman and Bernard Wernick Hammer to Iowa State College, Research Foundation, Ames, Iowa. No. 2,196,239. April 9, 1940.



Assures laboratory results in commercial practice. Write for explanatory manual and Bulletin TOU-3.

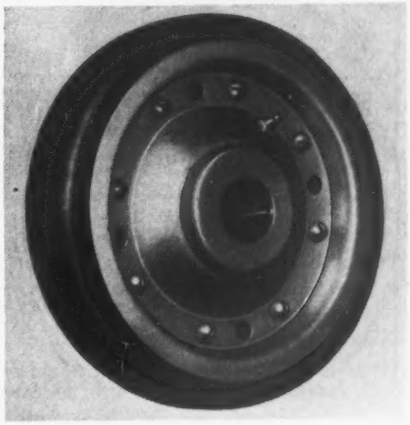
%proportioneers INC%

30 Codding Street, Providence, R. I.

Whether for light, medium or heavy duty use, Darnell Casters and Wheels are built to take punishment.

DARNELL
Casters & Wheels

—for Easier handling of the heaviest loads. They soon pay for themselves by saving floors, equipment, time and energy.



Built-in quality assures a long life of efficient service—it pays to "Demand Darnell Dependability".

DARNELL CORP., LTD., LONG BEACH, CAL.
36 N. CLINTON ST., CHICAGO, ILL.
24 E. 22ND ST., NEW YORK, N. Y.

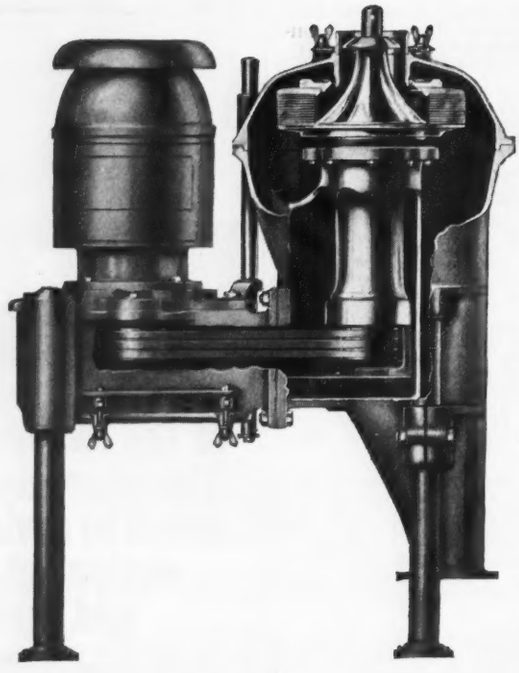
The end of an old tradition

that flour must have INSECT INFESTATION

THE BULK FLOUR

ENTOLETER
INFESTATION DESTROYER
REG. U. S. PAT. OFF.

destroys insect infestation mechanically in all stages, egg, larva, pupa and adult—delivering to the packer bin flour free from insect life.



ENTOLETE *your flour*

DESTROY INSECT INFESTATION AS PART OF THE MILLING PROCESS

Inexpensive

Easy to install and operate

Minimum Maintenance

ENTOLETER DIVISION
THE SAFETY CAR HEATING AND LIGHTING COMPANY, INC.
230 PARK AVENUE NEW YORK, N. Y.

Drying Method

(*Continued from page 63*)

to obtain a reliable end point. Unfortunately, an electrometric titrimeter was not available for electrometric titration according to a recent method described by Kirk and Tressler[9]. Because of the high temperature used in drying, it is unlikely the material contains significant amounts of ascorbic acid.

Discussion of Results

Results are given in Table I. From the data in the table the following conclusions may be drawn:

The method of drying has a marked effect upon the sugar content of the finished feed. Thus, feed produced by the drum dryer method, where the material is not pressed prior to drying, contains from two to over three and one-half times more sugar than the feed produced from waste limed and pressed before drying.

The statement that feed produced by steam-tube rotary dryers has a higher fiber content than that produced by direct-fired rotary dryers[8] is not substantiated by the results obtained here. The low crude fiber content of the feed made by drum drying cannot be adequately explained.

The high naringin content of waste dried by drum drying may be expected because the material is not pressed before drying. The presence of this glucoside would render such feed more bitter than that made by other methods of drying.

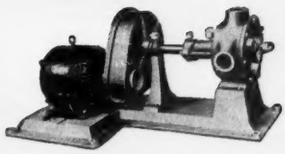
As would be expected, wastes limed and pressed before drying contain considerably more calcium than the material produced by drum drying where lime is not added.

Sulphur content of feeds produced by direct-fired dryers is higher than that made by steam-tube or drum dryers. This is to be expected where oil is used as a fuel and the gases of combustion come in contact with the material.

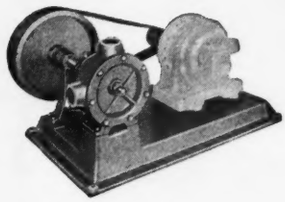
It will be noticed there is a wide variation in the silica, iron and aluminum content of feed dried in the same manner. This is probably because of the method of handling the raw material and the condition of the drying equipment. For instance, one plant unloads its raw material on the ground, from whence it is scooped to the conveyors. This, of course, will incorporate more or less sand. Other plants use wooden platforms in various degrees of cleanliness. Dryers, presses and hammer mills in some instances contain rust and scaling which would account, in part, for variation in iron and aluminum content.

The feed contains considerable

VIKING



LIQUID



FOOD PUMPS

We would like to introduce you to the complete line of Viking Rotary Pumps for the handling of all liquid and semi-solid food factory products. We are anxious to show how Viking can furnish you, immediately, standard stationary and time-saving portable models . . . how Viking is equipped to deliver, in a hurry, special pumps designed with special metals, mountings and drive arrangements. Send today for detailed information on Viking Liquid Food Pumps . . . we will fire the Bulletins back by return mail.

Look For This Trade Mark—The Sign Of A Genuine Viking

VIKING PUMP COMPANY
CEDAR FALLS, IOWA

amounts of pectin, but because of the high temperatures used during dehydration it is quite probable that this pectin, if leached from the material, would be of poor jellying power.

Conclusions

The method of drying citrus waste in Florida has an effect upon the chemical composition of the finished product.

Dried waste produced by liming and pressing prior to drying is considerably lower in sugars than material not pressed before drying. According to our results, feeds produced by steam drying do not have a higher fiber content than those produced by direct-fired dryers.

The dried material contains considerable pectin, but because of the high temperatures used during drying, probably the recovered pectin would be of low jellying power.

Pressing the material before drying results in a loss of nutrients.

None of the samples examined contained carotene.

What the Public Thinks

(*Continued from page 41*)

labor or the farmer receive more money than they now do for their part in preparing food?" Some of those interviewed mentioned both farmer and labor as entitled to a greater share of the food dollar, while others mentioned only one. Totaling indicates that 28.4 percent of those interviewed believed that labor should receive more, while 60.4 percent believe that the farmer receives too little.

Cross checking of answers to this question indicates a difference of opinion geographically according to sex and according to income. The New England states showed the highest proportion of those who believed prices under government ownership would be lower. The Middle Atlantic states were next and the Middlewest last. More men than women are of the opinion that prices under government ownership would rise, while more women than men believe that prices would go down as the result of government ownership. Again, the upper income levels tend to think prices would rise, while the lower income groups, more than the higher income groups, believe that prices would be reduced as a result of government ownership.

A further question was asked to bring out opinions as to where the increases for labor or the farmer would or should come from. This brought forth a variety of responses, the first of which is surprising.

—and it's not
COUNTERFEIT!

Turning potatoes into real money is a year-round performance for owners of

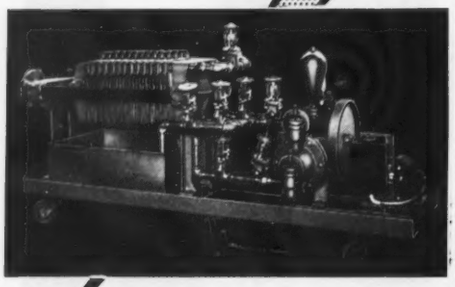
FERRY POTATO CHIP MACHINES

They can out-produce competitors with other methods of manufacture because these Automatic Continuous Machines turn out more *uniformly* better chips at lower cost per pound —hour after hour, day after day. These machines can produce 50 to 350 pounds of chips per hour that are always crisp, tender, sweet and dry—no rancidity, no sogginess, no parching. The kind of chips that build volume business and important profits . . . If complete details would interest you write today for illustrated Bulletin F.I.

ALSO MAKERS OF:
SLICERS & AUTOMATIC SLICER FEEDERS
CAN WASHING MACHINERY

J. D. FERRY CO.
129 SO. CAMERON ST.
HARRISBURG, PA.

Even BETTER than a Bee Can Do It!



Certainly a bee makes honey but a

SHRIVER FILTER

clarifies it so that you can read a newspaper right through a full gallon jar. And that crystal clear appearance appeals to the housewife.

Maybe there *is* something in the tie-up between perfect clarity and improved sales appeal. Hundreds of America's food products go through Shriver Filters to insure that sparkling brilliance that not only has made the cash register ring more often but has given the products better keeping qualities and flavor. That applies to cider, vinegar, fruit juices of all kinds, syrups, sugar, wines, distilled liquors, beer, jellies, preserves, extracts and salad oils. Some of them are even decolorized and deodorized.

Shriver Filters can give you the quality and clarity you want in your product and recover the by-product besides. They can be used at any temperature or pressure; made of any metal, wood or rubber; used with any filter aids or bleaching compounds. Such versatility spells production profit.

LET OUR LABORATORY

determine what better filtration can do for your product; send us a sample; we'll investigate the filtration rate, capacity and method to meet your requirements and give you our unbiassed recommendation. No obligation, of course.

T. SHRIVER & COMPANY

860 Hamilton St. Harrison, N. J.

Western Agent—The Merrill Co.
343 Sansome St. San Francisco, Calif.

FOR BETTER QUALITY
Shriver FILTERS
RECOVER SOLIDS · CLARIFY · DECOLORIZE

Table IX would indicate that the farmer-labor-industry problem is one which merits considerable serious consideration. When 52 percent of those interviewed even so much as admit they *think* they would be willing to pay higher retail prices that the farmer get a better return, the situation is noteworthy.

Browning of Peaches

(*Continued from page 52*)

berta, Halehaven, J. H. Hale, Golden Jubilee, Mikado, Late Elberta; and Georgia Bell and Hiley are popular among white flesh varieties. Of these, only the J. H. Hale (yellow) Georgia Bell and Hiley (white) are recommended for freezing preservation. Sunglo is a yellow-fleshed peach of good appearance and quality and is reported not to turn brown.

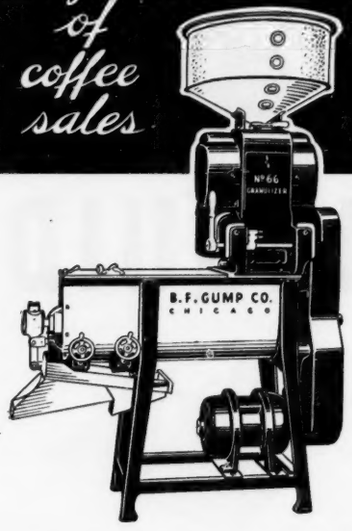
Summary

Soft ripe peaches can be frozen, stored, and served many months later without objectionable browning. But this is possible only when a series of difficulties are met, rather than relying on a single factor to prevent browning. Requirements are:

1. Speed in handling. The time between peeling and treating with anti-browning agents, as acids, thiourea and sirups, should not be more than five minutes.
2. Use acid in rinse water. A solution of citric acid (about as strong as lemonade) or hydrochloric acid for rinsing sliced peaches temporarily arrests browning and should be used as assurance against browning before freezing.
3. Cool as quickly as possible. All available data indicate that the temperature should be reduced to 0 deg. F. as quickly as possible. Obviously peeling, slicing, and grading should be done at as low temperature as practicable.
4. Exclude air from product. This is best accomplished by immersing the individual slices in an almost saturated solution of invert sugar, cooled to 0 deg. F., and allowing them to remain until fully frozen, then removing the excess sirup.
5. Surface browning occurs chiefly during preparation for freezing and is easily controlled by anti-browning agents. Internal browning is a result of cell injury by ice formation and is controlled only by total exclusion of the product from air during and subsequent to freezing or by rather high concentrations of acids or thiourea. The latter is apparently little controlled by chemical anti-browning agents, due to lack of penetration, but is controlled by a heavy sugar sirup glaze about each individual slice of peach.

AUTHOR'S NOTE: With the new development of untried materials that might act as anti-browning agents, as well as the development of new mechanical methods of handling peaches for freezing, some of the conclusions from the investigation reported herein will necessarily need to be revised in time. This work is being contnued for at least two more years in an effort to this end.

consistently uniform scientific grinds are great builders of coffee sales



GRANULIZED COFFEE

Consistently uniform, clean-cut grinds that retain the maximum of the true flavor and aroma of your whole-bean coffee will help you build customer confidence in your product that will pay dividends in extra volume.

Whether your problem is the uniform production of one size "steel-cut" grind, or a complete range of grinds from pulverized to coarse steel-cut, you will find that there is a Gump "All-Roll" Granulizer suitable for your every coffee grinding requirement.

User endorsement is assurance of efficiency and satisfactory service. Read what one user says:

"We installed the new Granulizer, and put it into use just as promptly as we could—its performance is in every way up to your claims for it. It is doing a better job, and doing it much faster than our old grinder did. We are certainly satisfied with it."

You, too, will *certainly be satisfied* with the improved grinds and increased efficiency of a Granulizer.

Made in Four Sizes

Made in sizes with capacities as small as 400 lbs. and as high as 4000 lbs. per hour; and in models for producing "Steel-Cut" only, or a complete range from pulverized to coarse steel-cut grinds. Write today for complete information, and samples of granulized coffee.

B. F. Gump Co

Established 1872

454 S. CLINTON ST., CHICAGO, ILL.

Fast-Heating Coils

No. 55 Super Coil of seamless Pure Nickel. Made of 3" OD x 16 gauge tubing this coil has a capacity of 55 sq. ft., and is recommended for a 1000 gal. tomato pulp tank. Headers are also of Pure Nickel. Mfrd. by Food Machinery Corporation, Hoopeston, Ill.—this coil is regularly used for catsup, tomato juice and pulp and other tomato products. Other sizes of coils are also regularly available.

For Cooking Catsup . .

Regularly used for juice, pulp and other tomato products, and made of Pure Nickel

One thing you expect of cooking coils is long, economical service. And you doubtless know how to assure it: Specify a metal that is tough and strong as well as resistant to corrosion. What *else* do you want? If it's *fast cooking*, order a Food Machinery Corporation "Super Coil" . . . made of Pure Nickel.

In qualities that assure long life for coils Nickel, as you know, rates tops. But even *more* important are its *heat transfer* qualities. In this respect Nickel is better than *any other metal of comparable strength and corrosion resistance.*

For cooking tomato and other food products, specify coils of Pure Nickel. Write for Bulletin TS-8, "Corrosion Resistance of Materials for Pea, Corn and Tomato Processing." Address:

Nickel **THE INTERNATIONAL NICKEL COMPANY, INC.**
67 Wall Street **New York, N. Y.**

Formulas for Foods

FORMULA NO. 80

Root Beer Extract

Sarsaparilla	**6 oz.**
Spikenard herb	**½ oz.**
Wintergreen	**2 oz.**
Birch bark	**1 oz.**
Sassafras bark	**4 oz.**
Wild cherry bark	**½ oz.**
Prickly ash bark	**¼ oz.**
Jamaica ginger root	**⅛ oz.**
Nutmeg	**⅛ oz.**

Working directions

Reduce all the ingredients to a powder by grinding. Put them into a percolator. Percolate to ½ gal. with a mixture of 2 parts of water and 1 part of pure grain ethyl alcohol.

Root Beer Sirup

Use 12 oz. of the preceding Root Beer Extract with 1½ gal. of simple (36 deg. Bé.) sirup.

Add 1 oz. of fruit acid (see Formula No. 18) and 2 oz. of caramel color.

NOTE: Root beer flavors can be varied considerably. Some brands on the market are high in sweet herbs and low in bitters, and vice versa. For experimental formula development, separate percolations can be made of the several ingredients followed by blending to suit.

Formula from David Algie

FORMULA NO. 81

Strawberry-flavored Sirup

Strawberry juice (sirup) drained from (2 plus 1) strawberries	**39 gal.**
Sugar (sucrose)	**300 lb.**
Red color (strawberry)	**3 pt.**
Sodium benzoate (dissolved in 1 qt. hot water)	**½ lb.**
Corn sirup	**2 gal.**
Strawberry fruit extract	**1 gal.**
Production	**55 gal.**

Working directions

Strawberry juice remains from making whole strawberry preserves from 2 plus 1 frozen strawberries. The foregoing formula is based on a sirup density from the barreled fruit of 23 deg. Bé. Fruit yielding a 28 deg Bé. sirup needs only 200 lb. of sugar in the formula. (For calculations covering these formula adjustments see FOOD INDUSTRIES, 5, 501, 1933. The Editors.)

If mechanical stirrers are available, the sugar should be dissolved in the cold juice. In the absence of a mechanical stirrer, dissolve by hand stirring with as little heating as possible to obtain solution.

All the other ingredients are added while the sugar is being dissolved.

When the sirup is all made, allow it to stand in the kettle without heat or agitation for 15 minutes. This will float all solid particles of fruit, and will result in drawing off a sparkling clear sirup from the bottom.

Formula from David Algie

FORMULA NO. 82

Lemon-flavored Sirup

Fresh lemons, reamed to make juice	**47 gal.**
Water	**55 gal.**

Or else use:

Concentrated lemon juice	**10 gal.**
Water	**92 gal.**
Sugar (sucrose)	**1,700 lb.**
Sodium benzoate dissolved in 1 gal. hot water	**2 lb.**
Yellow color	**1 qt.**
Emulsion:	
Oil of lemon	**10 pt.**
Gum arabic	**10 lb.**
Water	**20 pt.**
Production	**240 gal.**

Working directions

Dissolve the sugar and sodium benzoate in the lemon juice and water. Emulsify by beating the oil of lemon, gum arabic and water. Then add the emulsion, with constant stirring, to the foregoing.

Make the yellow color by dissolving 4 oz. of Tartrazine (a certified food color) in about 3 qt. of warm water. Add to it ½ oz. of sodium benzoate solution (Formula No. 10) to prevent bacterial growth in the unused color solution. Then make up to a full gallon. Use 1 qt. of the color solution in a batch.

Formula from David Algie

FORMULA NO. 83

Worcestershire Sauce

Concentrate

English onions	**10 lb.**
Garlic	**5 lb.**
Sugar	**20 lb.**
Salt	**7½ lb.**
White ginger	**4 lb.**
White pepper	**2 lb.**
Lime juice	**5 gal.**
Acetic acid (80 per cent)	**1 gal.**
Water	**20 gal.**

Make the ginger and pepper into a paste with a little of the water. Add 2 gal. of boiling water, stirring well, and allow to stand overnight.

Next day, pass the onions and garlic through a fine mincing machine.

Place the lime juice in a steam pan (steam-jacketed kettle) and add the rest of the water, together with the sugar and salt.

Bring to a boil.

Skim, and pass through a fine sieve.

Return the liquid to the pan and add the spices, and also the minced onions and garlic.

Gently simmer for 30 minutes.

Now add the acetic acid.

Rub through a fine sieve.

Formula from H. B. Cronshaw, London, England

FORMULA NO. 84

Blood and Tongue Sausage

Sweet pickled tongues (scalded)	**65 lb.**
Back fat (cubed)	**15 lb.**
Blood	**20 lb.**
Dry milk solids	**3½ lb.**
Onion powder	**1 oz.**
White pepper	**6 oz.**
Salt	**1 lb.**

Cut tongue into 1 in. cubes. Place in meat truck and add blood, back fat, dry milk and spices. Mix well.

Stuff in beef cap ends or artificial fibrous casing. Cook at 160 deg. F. until when pricked no blood comes out, which will be in 2¾ to 3½ hours, depending on size of casing. Chill rapidly in cold water.

See also general directions for sausage manufacture (Formula No. 22).

Formula from Dry Milk Institute

(Turn to page 108)